RETIREMENT OF MR. AKENHEAD

Mr. D. Akenhead retired as Director of the Commonwealth Bureau of Horticulture and Plantation Crops on the 31st March, 1959. He had been in charge of the bureau since its foundation thirty years ago on the 1st April, 1929. Throughout this long period he was the guiding spirit of this journal, and the success which it has attained has been entirely due to his leadership.

Mr. Akenhead was succeeded as Director by Mr. G. K. Argles.

J. G. MALLOCH

Chairman
Executive Council
Commonwealth Agricultural Bureaux.

HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews not by Bureau staff are by R. J. Garner and A. M. Massee of the East Malling Research Station and by J. R. Llewelyn.

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SALIENT ITEMS, Vol. 29, No. 2.

CLIMATIC FACTORS

General:—A new book entitled "Weatherwise gardening" should be mentioned, even if it does serve to perpetuate the delusion that the British Isles suffer from weather, whereas most other countries enjoy a climate (1994). Also useful, though less readable, are data and maps on the world distribution of atmospheric water vapour pressure (1012) and, possibly, records of evapotranspiration in Hong Kong (1013).

Temperature:—When plants are grown in the normal 24-hour cycle of light and darkness certain temperatures are optimal for growth, but if the total length of the day-night cycle is altered artificially the temperatures that are optimal also change (1021). Among individual plants in which temperature responses have been studied in some detail are peas (1038, 1442-1444) and garlic and shallots (1483, 1485, 1486, 1488). A series of papers on the effects of root temperature on citrus is also of particular interest (1797-1800).

Water:—The effects are described of different levels of available soil moisture on the growth and physiological activity of various crops (1023, 1386, 1387, 1410, 1570, 1805). For vines in the

Crimea the ratio between seasonal transpiration and yield per unit area has proved a reliable guide to irrigation needs (1206).

Wind protection:—German work confirms that shelter belts of about 50% permeability afford the best wind protection (1240). In Russia shelter belts seem able to protect relatively large tracts of land (1241). Given a plentiful supply of soap bubbles, it can be demonstrated that cold air moves into frost pockets in late afternoon rather than during the night (1242).

Smog:—Ozone may be sought by holiday-makers, but its various effects on plants all seem to be deleterious (1014, 1015, 1568).

GROWTH AND REPRODUCTION

Pruning and ringing:—A new method of pruning apple trees is described (1139). With citrus trees drastic cutting back, referred to as skeletonization, has a pronounced effect on root growth and on root and branch composition (1826, 1827). With peaches the longer winter pruning is delayed the lower is the vigour of the shoots produced the following spring (1143). Sulphuric acid, previously used to ring tobacco, has been applied successfully for the same purpose to tomatoes (1528).

Flower formation:—The results of experiments on kalenchoës suggest that two separate processes are involved in flower formation, and that these are better served by diurnally fluctuating temperatures than by any one constant temperature (1730). With carrots flower formation is induced by vernalization, but only if sugars are present (1493). With cucumbers treatment with acetylene gas can increase the number of female flowers and the yield of fruit (1426).

Pollination:—Hormone treatment of the stigmas immediately before pollination may enhance seed production in several vegetable crops (1379). With parthenocarpic persimmon varieties citrus pollen or dust may induce fruit set (1869). For cherries the effectiveness of bees as pollinators varies with the distance of the apiary (1117) and for strawberries with the particular variety (1190). Failing bees, try bats, if the crop is Manila hemp (1631).

Fruit growth and thinning:—The avocado fruit shows the usual sigmoid growth curve, but certain other features of its development are rather distinctive (1781). Another plant to exhibit unusual behaviour is the acerola tree, which may bear 5 distinct crops over a 9-month period (1976). The effects of removing flowers and young fruits on subsequent flower bud formation are considered for apples and citrus (1146, 1825).

MACHINERY, BUILDINGS AND EQUIPMENT

Machines and implements:—In addition to general information on Russian machines available for vegetable growing (1067, 1068) and on the progress of mechanization in German viticulture (1212), there are descriptions or performance reports of the following items: Devices for counting, packaging and sowing seeds (1065, 1073, 1074), equipment for laying plastic strips used as seals in soil fumigation (1066, 1078d), a machine for planting bananas (1878), a weed "breaker" and a garden cultivator (1063, 1064), a hedging machine (1077y), a machine for laying and covering vines for winter protection (1244), two green-pea harvesters (1449, 1450), a vegetable washing machine (1400) and a machine for spearing tobacco plants preparatory to curing (1592).

Glasshouses and nursery equipment:—Apart from abstracts that are well sign-posted (1049-1053), three papers on particular types of glass and plastic house are noted (1077a, 1078e, 1078f). Equipment includes automatic watering devices (1056, 1058) and two steam-sterilizing units (1070). Polystyrene seems to be a good material from which to make flower pots (1072).

Driers:—Several used for cacao beans are described and compared (1891).

Research apparatus:—More devices for measuring leaf areas (1075, 1077z), a controlled temperature chamber for hardiness studies (1087), logarithmic plot sprayers (1071, 1077j), and apparatus for determining respiration rates (1077t).

METHODS, PRACTICAL AND EXPERIMENTAL

Harvesting and marketing:—Bulk-harvesting is represented by 4 papers on apples (1158, 1159, 1175a, 1176k), and there are also notes on picking platforms and baskets (1175q, 1175s). Methods of packing are considered for apples, avocado pears and other produce (1078h, 1162-1164, 1784) and methods of hydrocooling and waxing for citrus (1852, 1853). The loading and transport of fruit and vegetables also receive attention (1061, 1062, 1175f, 1196), as do investigations on the behaviour of citrus fruits during shipment (1856, 1857). Finally, there is some ammunition for those who may be concerned in the old controversy of road *versus* rail haulage (1060).

Practical techniques:—For applying fumigants to soils (1556, 1847), for extracting alkaloids from plants (1609, 1616) and for judging quality in tomatoes (1543).

Research techniques:—For sampling and handling leaves for analysis (1828, 1875), for regulating and recording spray distribution patterns (1057, 1317, 1327), for autoradiographic assays (1035, 1078a), for punch-carding seed envelopes used in experiments (1078i) and for measuring leaf turgor (1907).

Analytical procedures:—For determining amino acids and carbohydrates (1076, 1470), vitamin C (1546, 1653), citral in lemon oil (1870x), phenolic compounds (1176p, 1579) and insecticide deposits and residues (1323w, 1324a, 1324h, 1552r, 1851).

Field experimentation:—More evidence that cacao yields are largely determined by variables operative during establishment, and a suggestion that early checks to development have permanent effects which cannot be remedied (1888).

NUTRITION AND SOILS

Soils and their management:—Soil pH in relation to nutrition is considered for vegetables, tobacco and citrus (1522, 1560, 1812, 1813), but perhaps the most startling suggestion is that the optimum pH for vines changes as the plants grow older (1207). Investigations are also reported on the effects of orchard soil management practices on the nitrogen and organic carbon status of soils (1124, 1125) and of soil aggregate size on the availability of oxygen and on the growth of tomatoes (1518).

Deficiency symptoms:—Described for deciduous fruits (1233), blueberries (1238), garlic (1484) and oil palms (1914).

Mineral composition of plants:—Leaf and soil analysis studies aimed at introducing "nutritional control" into banana plantations are described (1880). Several papers suggest new approaches to the interpretation of leaf analysis figures (1129, 1382, 1943). In citrus the ability of the trees to form flowers would appear to be closely linked with the P content of the leaves (1821).

Nutrient uptake and movement:—Studies, again on citrus, have led to the suggestion that a mathematical relationship exists between root cation exchange capacity and cation absorption (1809, 1810). The cation exchange capacity of the roots of several vegetables may be altered when toxic amounts of several heavy metals are present in the nutrient solution (1385). Various potassium salts are compared as sources of foliar-applied K for tobacco (1566). Beans continue to be a favoured plant for studies on the uptake and movement of radioactive nutrients (1453, 1458-1460).

Minor elements:—Traces of fluorine and iodine may stimulate growth in tomatoes (1030, 1521). Boron deficiency results in abnormal vascular development in cucumbers (1425). Manganese excess may cause bark necrosis in apples and pears (1234, 1235). Zinc deficiency may be caused by the application of mercurial fungicides (1904) and can be cured by the application of a mixture of Zn chelate and soda ash applied to the soil in small heaps (1823).

PHYSIOLOGY AND BIOCHEMISTRY

Abscission:—Oh! for the days when leaves merely dropped (1462, 1679).

Growth substances:—The flood of information on the effects of gibberellins and on their interactions with photoperiod and other factors continues (1037-1040, 1188, 1658, 1690, 1749, etc.). In addition, there is further information on different types of gibberellin (1036, 1042) and on a gibberellin-like substance produced by a yeast (1043), and also an hypothesis which suggests that gibberellins plus anthesins equal the flowering hormone "florigen" (1041). Among papers on 2,4-D are two which throw additional light on the mechanism of its action (1457, 1524).

Organic compounds in plants:—Studies on the metabolism of chlorotic leaves deserve attention (1017, 1018). Paper chromatography of polyphenols and other substances may be of assistance in taxonomic studies of camellias of the tea group (1971). By contrast, certain other compounds, such as alkaloids and saponins, may vary greatly within a single species from one region to another (1604, 1615).

Photosynthesis:—Have we got the picture of what happens quite right (1026)?

Radiation effects:—The germination of lettuce and castor seeds has been affected by irradiation with deuterons and X-rays (1502, 1503, 1646). Abnormalities induced in *Nicotiana* species by gamma-rays have been accompanied by increases in the content of free amino acids (1576). A tomato mutant has been produced by beta particles released by radioactive phosphorus (1513). The uptake by plants of radioactive strontium from soils, which is low in the presence of calcium, may be increased if stable strontium is present (1034). The prophets of doom will be encouraged by the news that injury caused by radioactive sulphur may be more pronounced in the progeny of treated plants than in the treated plants themselves (1033).

PLANT TROUBLES AND PLANT PROTECTION

Peach replant problems:—The emphasis on this occasion is divided evenly between toxic extracts from peach roots (1103, 1104) and nematodes (1281, 1282).

Weeds, parasitic plants and algae:—Having decided that weeds affect vegetable yields (1369), it is possible to consult a new weed control handbook (1985). Studies on broomrape and its host plants suggest interesting possibilities (1337, 1338). New techniques are available for applying herbicides to control aquatic weeds (1340) and for testing potential algicides (1332).

Viruses:—In cucumbers virus infection may alter the proportions of male and female flowers formed (1428). In cherries there are grounds for believing that necrotic ring spot virus may be transmitted by pollen (1252). A case is recorded in which diseased tomato plants recovered following the application of growth substances (1531). Skim milk is back in circulation as a virus inhibitor (1532); other substances that may act as inhibitors include Cytovirin (1533, 1588), trichothecin (1583) and ribonuclease (1587). A method of preparing virus antisera from strawberries is also described (1255).

Bacteria:—Do you know what a biochemical mutant is? If not consult 1498 and 1589.

Fungicides:—Readers who, like the writer, confidently imagined that all problems connected with the preparation of bordeaux mixture were solved years ago will have to eat humble pie (1315). The choice of the right type of mineral oil for use on bananas attacked by leaf spot disease is also a complicated business (1882). Among other problems examined are the corrosive effects of fungicides on metals (1069), the best types of implement for incorporating them in soil (1314), and their effects on the balance between harmful and beneficial mites in orchards (1285).

Phytotoxicity:—For a variety of aspects see 1313, 1393, 1396, 1415 and 1432.

Miscellaneous pests:—Aquatic snails (1510, 1511), rabbits and mice (1312, 1755), and starlings and cockatoos (1311, 1962).

Big fleas have . . .:—Can anyone go one better than 1761?

PROPAGATION

General:—Another book, described by the reviewer as small, simple but efficient, is available (1991).

Seeds:—Seeds from the lower half of a tomato fruit are a better proposition than seeds from the upper half (1376), and washed seeds are better than unwashed (1377, 1913). In a variety of fruits most, if not all, the seed germination inhibitors present appear to be phenolic acids or their depsides (1047). Included among other papers are studies of substances stimulating or inhibiting germination (1378, 1501, 1683) and an investigation of biochemical changes associated with dormancy and after-ripening (1762). Food for thought is also provided by a paper on the ecological significance of red-light sensitivity of tobacco seeds (1555).

Cuttings:—It may occasion surprise to read that in one nursery a heavy, red clay has proved a satisfactory rooting medium in a mist unit (1661). Under some conditions the treatment of cuttings with boron may result in quicker rooting (1746). With metasequoia cuttings seasonal trends in rooting capacity may be reversed by the use of IBA (1760).

Grafting:—Aids include a new type of tie (1664) and plastic sheets laid directly onto grafted plants (1768).

Rootstocks:—The search for dwarfing rootstocks for ornamentals is being extended (1742, 1773).

Rootstock-scion relations:—Considerable patience is needed before the final effects of stocks upon scions can be assessed in apples (1094). Additional information on the production and translocation of alkaloids in tobacco scions grafted on tomato stocks (1573) may be supplemented by a study of arbutin in pears worked on various arbutin-free stocks (1155). The latest batch of papers on vegetative hybridization includes one which suggests that slight wilting of the scions intensifies the effect (1515).

MISCELLANEOUS

Economics:—Various guides and surveys (1010, 1083, 1403, 1673).
Historical:—The effect of religion on the spread of citrus (1787).
Jaded palates:—A new fruit for (1981).
Moral turpitude:—In *Spathiphyllum* (1716).
Mushrooms:—Cultivated on sawdust (1468).
Vanillin:—Extraction from vanilla pods improved by ultra-sonic waves (1602).

MISCELLANEOUS.

General.

(*See also* 1077u, v, 1078i, 1986, 1992, 1994, 1999, 2002, 2005-2007, 2012, 2018a, n.)

1009. MINISTRY OF AGRICULTURE, LONDON.
At the farmer's service.
[*Publ.*] *Minist. Agric. Lond.*, 1958, pp. 68.

This most useful, pocket-size booklet provides information on the numerous services available to farmers in England and Wales. It contains an index and a comprehensive address and telephone list.

1010. BENNETT, L. G., AND REID, I. G.
Management in horticulture.
Tech. Publ. Essex Inst. Agric., 1958, pp. 48, bibl. 1, illus.

The application of scientific management in horticulture is limited to some extent by the variability of its biological material, both human and plant. But, as is shown in this series of lectures, there is no doubt that management based on economic principles can not only directly increase profits, but can also discover the origin of losses. These lectures were delivered to an audience of growers, thus the technical side of management was not included. Four of the five lectures were given by Bennett, who discussed the principles of management, simple records for management purposes, diagnosis of defects in management and budgeting; work study was the subject of the fifth lecture by Reid. Both authors showed ways in which the efficiency of a holding may be increased, and examples amplify the arguments of the text.

Statistics and experimentation.

(*See also* 1077h, s, 2018j.)

1011. GOMES, F. P., AND GUIMARÃES, R. F.
Joint analysis of experiments in complete randomised blocks with some common treatments.
Biometrics, 1958, **14**: 521-6, bibl. 6.

If the residual variance estimates of the separate experiments are not too different, a joint analysis may be carried out for the whole set, which is then considered as a single trial with incomplete blocks. An example is given.

Climate and air pollution.

1012. TUNNELL, G. A.
World distribution of atmospheric water vapour pressure.
Geophys. Mem. Lond. **12,** No. 100, 1958, pp. 61, 10s.

The first part of this is an atlas of the world distribution of the daily mean of atmospheric water vapour pressure for the months January, April, July and October. Data from 3,500 stations were used. A formula is given for the variation of long-period mean of day averages of vapour pressure with height, whereby mean of day values can be reduced to sea level. Thus the maps can be used to give values for any position or height in the world. Part 2 gives a brief survey of the world distribution of diurnal variation of vapour pressure, its general characteristics and its association with different types of climate.

1013. RAMAGE, C. S.
Evapotranspiration in Hong Kong: a second report.
Pacif. Sci., 1959, **13**: 81-7, bibl. 7.

Records of potential evapotranspiration and meteorological observations for 5 years are given and a simple formula for P.E. worked out which gives values in reasonable agreement with those observed.

1014. TODD, G. W.
Effect of ozone and ozonated 1-hexene on respiration and photosynthesis of leaves.
Plant Physiol., 1958, **33**: 416-20, bibl. 9.

The treatment of Pinto bean leaves with either ozone or ozonated hexene gas in air [which is able to reproduce injury caused to herbaceous plants by toxicants present in the air of the Los Angeles area] caused a rise in the respiration rate up to more than 4 times that of untreated control leaves. Plant responses to the 2 gases were similar. The rate of photosynthesis of treated bean leaves was less than that of controls. Both the amounts of stimulation of respiration and the inhibition of photosynthesis were directly related to the development of visible injury symptoms in certain tissues of the bean leaves. No stimulation of bean leaf respiration or inhibition of photosynthesis occurred unless visible injury developed. However, ozone caused a rise in the respiration rate of Valencia orange leaves with no concomitant development of visible injury. Citrus leaves gave no response until ozone concentrations approached those required to produce visible injury symptoms. Treatment with ozonated hexene at concentrations eliciting changes in respiration and photosynthesis in bean leaves caused no change in these processes in citrus leaves. A comparison of ozone- and ozonated hexene-treated bean leaves showed that the respiratory quotients were not different from that of the control leaves. [Author's summary.]—Univ. Calif. Citrus Exp. Stat., Riverside.

1015. Kemmerer, J. B.
The menace of smog.
World Crops, 1959, **11**: 14, illus.

In California it has been observed that smog lowers chlorophyll content and reduces photosynthetic activity. Four hours exposure caused a 10% reduction and 24 hours a 67% reduction. Smog also breaks down cell membranes and kills the protoplasm within. Motor car exhausts are the greatest source of smog in Los Angeles.

Chemical composition.

(*See also* 1077g.)

1016. Acheson, R. M.
The anthocyanins of some Canadian plants.
Canad. J. Biochem., 1959, **37**: 1-4, bibl. 10.

The anthocyanins of 36 Canadian flowers and berries were examined and the anthocyanidins identified. No new types were detected. The results, which are tabulated, refer mainly to flower petals, but among the few fruits examined were 4 species and varieties of *Rubus*, and 1 each of *Prunus* and *Vaccinium*.—Dep. Biochem., Univ. Oxford, England.

1017. DeKock, P. C., and Morrison, R. I.
The metabolism of chlorotic leaves. I. Amino acids.
Biochem. J., 1958, **70**: 266-72, bibl. 26.

The free amino acid content of healthy and chlorotic leaves has been studied. Iron-deficient chlorotic leaves contained enhanced amounts of free amino acids, even when the iron deficiency was induced by heavy metals or was due to genetical causes. In iron-toxicity chlorosis, however, the content of free amino acids was not very different from that of healthy leaves. It would appear that the free amino acid content of leaves depends upon their iron status, as reflected by the phosphorus:iron ratio. [Authors' summary.] Among data tabulated are the free amino acids found in healthy and iron-deficient spinach-beet and pea leaves, in variegated bougainvillea leaves and in young (white) and old (green) cabbage leaves.—Macaulay Inst. Soil Res., Craigiebuckler.

1018. DeKock, P. C., and Morrison, R. I.
The metabolism of chlorotic leaves. II. Organic acids.
Biochem. J., 1958, **70**: 272-7, bibl. 21.

Organic acids in healthy leaves and leaves chlorotic due to iron deficiency, heavy-metal toxicity, ageing, virus infection and genetical constitution were quantitatively studied. All types of chlorotic leaves contained more citric acid relative to malic or oxalic acid, except in virus yellows in sugar beet where the reverse is true. The citric acid:(malic+oxalic acid) ratio of leaves appears to vary as the phosphorus:iron and potassium:calcium ratios. The total amount of organic acid also varied inversely as the phosphorus content of the leaf. Green leaves apparently contain large quantities of either malic or oxalic acid. [Authors' summary.] The samples investigated included variegated leaves of bougainvillea and kale, green and chlorotic leaves of peas and inner and outer cabbage leaves.—Macaulay Inst. Soil Res., Craigiebuckler.

1019. Hewitt, E. J., and Afridi, M. M. R. K.
Adaptive synthesis of nitrate reductase in higher plants.
Nature, 1959, **183**: 57-8, bibl. 8.

Nitrate reductase activity was rapidly induced in small fragments of leaves of cauliflower, white mustard and sunflower. The effects of introducing nitrate or molybdenum or both are described.—A.R.C. Unit, Long Ashton Res. Stat.

1020. Barbour, R. D., Buhler, D. R., and Wang, C. H.
Identification and estimation of catabolic pathways of glucose in fruits.
Plant Physiol., 1958, **33**: 396-400, bibl. 12.

The operation of an oxidative pathway involving a C_1–C_5 cleavage for glucose catabolism has been demonstrated in tomatoes, cucumbers, limes and oranges. A method has been devised in estimating pathway participation in tomatoes which reveals that 84% and 16% of the fruit glucose is catabolized via the EMP–TCA processes and the alternate oxidative pathway respectively. [Authors' summary.—Ore. St. Coll., Corvallis.

Physiology.

(*See also* 1077n, 1078j.)

1021. Went, F. W.
New mechanism of temperature adaptation in plants.
Abstr. in *Science*, 1958, **128**: 1149.

In earlier work on the effects of temperature on tomato plants, it was found that the relatively low optimal temperature for growth and fruit set is due to an interaction between a temperature effect with a Q_{10} of 2 to 3 on growth processes and one with a Q_{10} of about 0·8 on sugar translocation. After it was established that, for optimal growth of tomato (both in length and in weight) and other plants, the plants should be subjected to a succession of light and darkness on a 24-hour cycle basis, the optimal length of this cycle was determined at different constant temperatures. A large number of individual experiments unequivocally show that at the optimal range of temperature for growth (20° C.) the optimal cycle length is 24 hours, but at 15° C. it is about 28 hours, and at 30° C. it is 18 hours. Therefore, the cycle length for optimal tomato growth has a Q_{10} of 1·25. Practically the same value for Q_{10} was found for nyctinastic movements of *Phaseolus* leaves, growth of *Baeria chrysostoma*, and development of *Saint-paulia ionantha*.—Mo. bot. Gdn.

1022. Klešnin, A. F., Šul'gin, I. A., and Bokovaja, M. M.

The specific heat and bound water of plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1958, **122**: 940-3, bibl. 6.

The relationship between free and bound water content and specific heat of maize and pea seeds is discussed. Further, when 38 species examined were divided into hydrotypes, the leaves of mesophytes were found to have the highest bound water content (32·46% of total water content) followed by those of xerophytes (24·99%), hydrophytes (8·61%) and succulents (5·76%). The leaves of succulents had the highest specific heat (0·956), then those of hydrophytes (0·908), mesophytes (0·820) and xerophytes (0·709). Most of the plants were temperate and tropical crops or ornamentals.

1023. Badaljan, V. S.

Inadequate soil moisture content and the intensity of photosynthesis in some plants. [Russian, with Armenian summary.]

Izv. AN ArmSSR. Biol. s.-h. N., 1956, **9** (5): 15-25, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,124.

Drought resistant safflower and drought susceptible pea and lupin were grown from seed to the 2–3 leaf stage in soil at 60% field capacity, then until flowering at (I) 60%, (II) 45% and (III) 30%, and finally once more at 60% field capacity. The percentage of chlorophyll, in leaf dry weight, increased in treatment III by 29% in safflower and 18% in pea compared with treatment I. The increase per unit of leaf area was greater still owing to greater leaf thickness. The chlorophyll content in treatment II was unaffected. Inadequate moisture also more than trebled photosynthetic activity of the pea and nearly doubled that of safflower.

1024. Šternberg, M. B.

The effect of the orientation of leaf primordia of plagiotropic shoots on the growth of leaf blades. [Russian, with English summary.]

Bjul. Mosk. o-va ispyt. Prirody, Otd. Biol., 1956, **61** (3): 51-9, bibl. 13, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,177.

In *Aleurites fordii*, *Broussonetia papyrifera*, *Morus nigra* and *M. alba* anisophylly was observed, not only in the size, but also in the shape of leaves on the upper and lower sides of plagiotropic shoots. The lower leaves of tung differed from the upper ones, of the same age, in being more lobate while in mulberry and *Broussonetia* the upper leaves were more dissected. Nevertheless in all cases the area of the lower leaves was greater than that of the upper, as a result of more rapid cell division. The total and protein N, soluble carbohydrate and starch contents of the lower leaves of plagiotropic shoots of maple, mulberry and tung were higher than those of the upper leaves as a result not only of the greater leaf area but also of higher concentrations of the constituents. It is concluded that the orientation of leaf primordia may have as great an effect on the size and shape of the leaf as its position in the morphogenetical order on the shoot. [See also *H.A.*, 28: 1140.]

1025. Hayward, H. E., and Bernstein, L.

Plant-growth relationships on salt-affected soils.

Bot. Rev., 1958, **24**: 584-635, bibl. 221.

A review, including sections on germination, indicator plants, and salt tolerance of vegetables, fruit crops, ornamentals, shade and roadside trees.

1026. Krotkov, G., Runeckles, V. C., and Thimann, K. V.

Effect of light on the CO_2 absorption and evolution by *Kalanchoë*, wheat and pea leaves.

Plant Physiol., 1958, **33**: 289-92, bibl. 12.

Detached leaves of *Kalanchoë*, wheat and pea were placed in a glass chamber in the presence of known amounts of $C^{14}O_2$ and were kept in either darkness or light for one hour. The residual $C^{14}O_2$ was then removed and its amount and activity determined. From these analyses the amounts of $C^{14}O_2$ taken in and $C^{12}O_2$ evolved by the leaves were calculated. In *Kalanchoë* and wheat CO_2 uptake was observed both in light and in darkness, while in the pea it could be demonstrated only in the light. Whether or not photosynthetic CO_2 consumption prevailed, in each species examined CO_2 evolution also was observed. In wheat CO_2 evolution was enhanced by illumination while in *Kalanchoë* and peas it was usually reduced. It is concluded, therefore, that addition of the amount of CO_2 respired in darkness to that absorbed in light will not necessarily produce the value for the true photosynthesis of a leaf. [Authors' summary.]—Queen's Univ., Kingston, Ontario, and Harvard Univ., Camb., Mass.

1027. KUNITAKE, G., AND SALTMAN, P.
Dark fixation of CO_2 by succulent leaves: conservation of the dark fixed CO_2 under diurnal conditions.
Plant Physiol., 1958, **33**: 400-3, bibl. 11, illus.

Detached leaves of *Bryophyllum calycinum* are able to fix, in the dark, large amounts of $C^{14}O_2$ in the form of organic and amino acids. When these leaves are exposed to light in the absence of $C^{14}O_2$, radioactivity is found in the carbohydrate fraction. The dark fixed $C^{14}O_2$ is efficiently conserved and metabolized during subsequent photosynthetic reactions. [Authors' summary.]—Univ. Calif., Los Angeles.

Nutrition and soils.

1028. VENEMA, K. C. W.
The influence of light and transpiration on the uptake of potassium by plants.
Potash and trop. Agric., 1958, **1**: 1-10, bibl. 25.

The author reviews literature on K uptake by a wide range of plants, and concludes that its uptake by roots is not modified by white light or by transpiration.

1029. KRZYSCH, G.
Blattdüngung mit Mineralsalzen. (**The manuring of leaves with mineral salts.**)
Z. PflErnähr. Düng., 1958, **80**: 42-55, bibl. 98.

A review dealing with (1) the absorption and translocation of foliar nutrients; (2) the factors affecting the absorption of nutrients by leaves; (3) the effects of foliar nutrition, with special reference to fruit trees and vines.

1030. BAUMEISTER, W., AND BURGHARDT, H.
Die Bedeutung der Elemente Zink und Fluor für das Pflanzenwachstum. (**The importance of the elements zinc and fluorine for plant growth.**)
ForschBer. Wirtsch. Verkehrsminist. Nordrhein-Westfalen **388,** 1957, pp. 38, bibl. 7 and 30 respectively.

The effect of zinc was tested in water culture on horticultural and wild forms of *Silene inflata*. In both cases growth was increased, concentrations of 10 mg. and of 50 mg./l. nutrient solution respectively being optimal. The effect of sodium fluoride was studied on tomato and spinach. At 25 and 100 p.p.m. and at 50 and 150 p.p.m. F respectively, both crops suffered injury, but at 1–25 p.p.m. tomatoes were stimulated. In spinach, susceptibility to low concentrations of F may be due to the high F content of the plant, whereas tomatoes contain practically no F. Although, from the experimental results and from a review of the literature, it cannot be stated at present that F is an undoubted trace element, its growth-promoting influence in certain cases cannot be denied.

1031. NICOLAISEN, W., HARTMANN, H. D., AND TRIPPE, C.
Untersuchungen über den Umsatz verschiedener organischer Substanzen im Boden. (**Studies on the decomposition of certain organic substances in the soil.**)
Gartenbauwiss., 1958, **23**: 275-81, bibl. 5.

Under favourable conditions root residues of cabbage, beans and tomatoes were rapidly decomposed in the field, differences in speed of decomposition depending on root structure. The decomposition of composts of different ages is discussed.—Inst. Gemüseb., Tech. Hochsch., Hannover.

1032. SISA, M., AND HAZU, G.
Studies on the utilization of synthetic soil conditioners in horticulture. III. The influence of rain after the application on the aggregate formation and the effect on the control of soil-splashing. [Japanese, with English summary 30 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 133-9, bibl. 9.

Krilium-6 (VAMA) was much quicker to act as a conditioner than A–22 (HPAN). The soil aggregates formed by the use of conditioners showed greater stability against the beating action of raindrops than untreated aggregates. Soil splashing and adherence to plant parts were greatly reduced by the conditioners.

Radioactive isotopes.

(*See also* 1078g, 1157, 1458, 1564, 1565.)

1033. ŠESTAKOV, A. G., IVANOVA, G. F., AND ŠMEL'KOVA, N. I.
The response of plants to the radiation activity of S^{35} in the first and second generations. [Russian, with English summary ¼ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 4, pp. 29-40, bibl. 12.

S^{35} at 0·1–5·0 mC per 2-litre container was applied to water cultures of certain plants, the progeny of which were then grown in sand cultures. The effects in both generations were greatest in wheat, intermediate in oats, and least in peas. Damage was first observed at the 0·5 mC level, the seed yields in the first generation being reduced to 37% of the controls in wheat, 68% in oats and 90% in pea. Symptoms of injury were narrowing and darkening of leaves and an increase in their soluble carbohydrate content. The residual effect of S^{35} on the second generation was more injurious than its direct effect on the first.

1034. Romney, E. M., and others.
Influence of stable Sr on plant uptake of Sr^{90} from soils.
Soil Sci., 1959, **87**: 42-5, bibl. 5.

Addition of Sr (as nitrate or sulphate) at 0·1, 0·5 and 1 m.e. per 100 g. to 3 widely different soils already treated with Sr^{90} at a standard rate, increased the uptake of the radioactive product by bean plants. From an alkaline calcareous soil Sr uptake was low, particularly where the sulphate was used. From a fertile neutral soil, it averaged 10 times as high, with a greater difference between the actions of nitrate and sulphate, and from acid sandy loam 25–30 times as high as from the alkaline soil, with markedly higher values in this case on sulphate- than on nitrate-treated soil. The total amount of Sr accumulated by the plant was dependent on the Ca content of the soil.

1035. Medvedev, Ž. A.
Radioactivity assay of proteins and determination of the ratio of various fractions of radioactive compounds in plant leaves. [Russian, with English summary 6 lines.]
Biohimija, 1958, **23**: 801-8, bibl. 4, illus.

A new method is described for rapid determination of specific radioactivity of proteins and of the quantitative ratio of various fractions of radioactive compounds in plant leaves. Reprints of the leaf protoplasm are obtained on weighed pieces of filter paper under pressure. The reprints are washed with trichloracetic acid, acetone and ether, then reweighed. The specific activity of the residual proteins is computed from the surface radioactivity of the reprints. The method is simple and rapid, being suitable for quantitative determinations. [Author's English summary. See also *H.A.*, 28: 1019.]

Growth substances.

(*See also* 1077e, f, p, w, x, 1078k, 1144-1151, 1156, 1188, 1189, 1257, Weeds and weed control section, 1379, 1411, 1454-1457, 1469, 1496, 1504, 1524-1526, 1531, 1658, 1663, 1679, 1690, 1749, 1900, 1990.)

1036. Brian, P. W., and others
Gibberellic acid, Part VI. The biological activity of allogibberic acid and its identity with gibberellin B.
Plant Physiol., 1958, **33**: 329-33, bibl. 11.

*allo*Gibberic acid hydrate is shown to be chemically identical with the gibberellin B described by Yabuta *et al.* When rigorously purified it does not induce accelerated shoot growth of dwarf peas. It slightly inhibits the growth of cress roots, and this inhibition is not reversed by gibberellic acid. Earlier claims that gibberellin B stimulates shoot growth are attributed to incomplete removal of gibberellin A. These results indicate that ring A of gibberellic acid is of importance in determining biological activity. [Authors' summary.]—Akers Res. Lab., I.C.I. Ltd., Welwyn.

1037. Brian, P. W., Petty, J. H. P., and Richmond, P. T.
Effects of gibberellic acid on development of autumn colour and leaf-fall of deciduous woody plants.
Nature, 1959, **183**: 58-9, bibl. 4.

Most species treated with gibberellic acid, 0·005% aqueous spray plus 0·01% "Tween 20" and 1·0% glycerol, gave one or more of the following responses: delay in development of autumn foliage colour, delay of leaf abscission, renewal of shoot growth. This indicates the induction by gibberellins of typical long-day responses. *Taxodium distichum*, however, showed an anomalous and opposite response not yet explained.—Akers Res. Lab., I.C.I. Ltd., Welwyn.

1038. Lockhart, J. A.
The role of gibberellin in the control of pea growth by temperature.
Planta, 1958, **52**: 250-8, bibl. 22.

Early growth of Alaska pea seedlings was most rapid at higher temperatures in the greenhouse, but gibberellic acid promoted growth at all temperatures. Later vegetative growth was most rapid at lower temperatures; gibberellic acid did not increase the growth rate at low temperatures, but did increase growth at high temperatures. Gibberellic acid delayed but did not prevent the onset of maturity. In darkness seedling growth was not affected by gibberellic acid at any temperature from 10° to 30° C. Adenine had no significant effect on stem growth or on the onset of maturity at 30° C. under fluorescent light.—Calif. Inst. Technol., Pasadena.

1039. Kato, J.
Nonpolar transport of gibberellin through pea stem and a method for its determination.
Science, 1958, **128**: 1008-9, bibl. 7.

Using agar blocks and portions of pea stem, the translocation of gibberellic acid was shown to be almost equal in rate in inverted and normally placed portions, thus lacking the polarity characteristic of auxin translocation.

1040. Bech-Andersen, J.
Orienterende undersøgelser med gibberellin. (**Preliminary studies on gibberellin.**)
Horticultura, 1958, **12**: 153-9, bibl. 5, illus.

In preliminary, small-scale trials in Denmark spraying with 50, 100 and 200 p.p.m. gibberellin caused elongation in the following plants: azalea, chrysanthemum, coleus, dahlia, geranium, stock, sunflower, bean (*Phaseolus*), celeriac, maize, pea, potato, glasshouse and out-door tomatoes and vine. Gibberellin applied in lanolin induced elongation in hydrangea, holly, juniper, *Kolkwitzia*, *Ligustrum*, lilac, *Pseudotsuga*, rose and *Viburnum*. Seed treatment with gibberellin (6–400 p.p.m.) accelerated germination in beans (*Phaseolus*), carrots, peas and radishes. Earliness of flowering was achieved rarely and to a limited extent. In general, it can be said that gibberellin often reduced the size of the leaves and deformed them; it also caused chlorosis, but this could be cured by an extra supply of nitrogen. The increase in the top:root ratio usually resulting from the treatment either weakened the plants or, in the case of root crops, proved injurious.

1041. Tschailachjan, M. Ch. [Čajlahjan, M. H.]
Hormonale Faktoren des Pflanzenblühens. **(Hormones promoting the flowering of plants.)**
Biol. Zbl., 1958, **77**: 641-62, bibl. 72, illus.

The experiments presented in this paper show that (*a*) flower formation in long-day plants, brought about by gibberellins, is always preceded by the formation and growth of the stem, which is not so with short-day plants; (*b*) the gibberellins are not subject to decomposition in the leaves, under short-day or long-day conditions, but they act directly on the processes taking place in the buds of the stem; (*c*) the leaves of plants transferred to conditions of unfavourable day length inhibit neither the action of the gibberellins nor the formation of the stem and flowers. Consequently, the gibberellins must be regarded as hormones necessary for the formation of the stem. A compilation of the experimental data and their analysis suggested that the flowering hormones or florigen consist of two groups of substances, viz. of gibberellins necessary for stem formation and of anthesins necessary for flower formation. Neutral plants contain both gibberellins and anthesins at any day length. The lack of flower formation in long-day plants under short-day conditions is due to the absence of gibberellins, while short-day plants do not flower under long-day conditions because of the absence of anthesins. This conception requires further proof, but certain data exist today which appear to confirm it. [From translation of author's summary. See also *H.A.*, 28, 2108.]—Timiryazev Inst. Plant Physiol. Acad. Sci., U.S.S.R., Moscow.

1042. Krasil'nikov, N. A., and others.
The stimulating effect of gibberellins of different origin. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **121**: 755-8, bibl. 15, illus.

In the experiments described gibberellin preparation No. 1, obtained from a *Fusarium* sp. isolated from an affected grapevine, and preparation No. 2 [unspecified] were compared with gibberellic acid (gibberellin A3). Two-months-old plants of *Rudbeckia bicolor*, grown under short, 9-hour-day conditions, were treated daily with one drop of 0·02% solution of each of the substances for 45 days. Stem elongation occurred 2 weeks from the beginning of treatment with A3 and No. 1, with inflorescence formation and flowering soon afterwards. Response to No. 2 was somewhat slower, the plants being smaller but flowering at about the same time. The controls remained vegetative. From its effect on growth and the development of generative organs, it is concluded that No. 1 is the same as A3 and No. 2 differs only by its lesser effect on growth. No. 1 and A3 were also chromatographically identical, but chemical analysis is needed for final confirmation. [See also *H.A.*, 29: 61.]

1043. Krasil'nikov, N. A., and others.
A gibberellin-like substance produced by soil yeasts. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **123**: 1124-7, bibl. 3, illus.

The physiological activity of a substance obtained from *Torula pulcherrima* was compared with that of gibberellin preparation No. 1 from a *Fusarium* sp. and gibberellin A3. The procedure was similar to that described in the previous abstract, *Rudbeckia bicolor* again being used as the test plant. The preparation from yeasts caused less intensive stem formation and growth than A3 or No. 1, onset being delayed by 5–6 days and bud formation and flowering by 9–10 days. The plants were more compact, with well foliated main stems, shorter internodes and darker leaves.

1044. Zukel, J. W.
A literature summary on maleic hydrazide 1949-1957.
[*Publ.*] *Naugatuck Chem. Div., United States Rubber Company*, Bethany 15, Connecticut, 1957, pp. 170, illus.

The first part (14 pp.) consists of preliminary notes on ingredients, formula, toxicology, tolerance, assay methods, uses, effect of physical factors of absorption, morphological and physiological effects and dilution tables. The rest is devoted to 674 annotated abstracts of articles on the use of MH. A glance at the index reveals its importance to horticulturists.

1045. Brian, R. C.
On the action of plant growth regulators. II. Adsorption of MCPA to plant components.
Plant Physiol., 1958, **33**: 431-9, bibl. 7.

Interactions between a plant growth regulator, 2-methyl-4-chlorophenoxy acetic acid (MCPA), and monolayers produced directly from plant tissues were studied at pH 4·1, 4·3 and 4·7. Estimates were made of the amount of adsorbing material present in the various tissues, and thus "total adsorption" of MCPA to selected organs from 16 plant species was calculated. A broad correlation was found between the resistance of a plant to MCPA and its ability to adsorb the growth regulator, thus lending support to the suggestion that the foundation of species resistance may be partly based upon the extent of MCPA adsorption to sites not concerned in the physiological response. [Author's summary. Part I was noted in *H.A.*, 22: 3350c.]—Jealott's Hill Res. Stat., Bracknell, Berks.

1046. RAKITIN, JU. V., AND ŠIDLOVSKAJA, I. L.
Detoxication of some synthetic compounds in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **122**: 142-5, bibl. 9.

Germinating wheat and radish seeds were treated with ten 2,4,5-trichlorophenoxyacetylamino acids at 0·01% 2,4,5-T equivalent and fifteen α-naphthylacetylamino acids at 1% NAA equivalent and the effect of these derivatives on growing seedlings was compared with that of their respective precursors. All the compounds initially depressed both root and stem growth, but later they became detoxified, i.e. lost their physiological activity and the plants showed resistance and in some cases were stimulated. Wheat showed greater resistance to both groups than radish; NAA was more toxic than its derivatives, whereas 2,4,5-T was equally or less toxic than its derivatives.

1047. VARGA, M., AND KÖVES, E.
Phenolic acids as growth and germination inhibitors in dry fruits.
Nature, 1959, **183**: 401, bibl. 5.

The fruits of 24 spp. were examined and all inhibitors identified were phenolic acids or their depsides and polydepsides. These tend to be leached from fruits which remain on the tree until spring, but are not affected by storage under dry conditions.—Univ. Szeged.

1048. CORMACK, R. G. H.
The action of disodium versenate on the epidermal cells of living brassica roots.
Canad. J. Bot., 1959, **37**: 33-9, bibl. 26, illus.

Seedlings of *B. napus* var. *oleifera* with roots a few millimetres in length were floated on disodium versenate solutions, 0·015% to 0·020%, for 48 hours. Those parts of the roots which had developed in tap water prior to this treatment remained normal, but those parts which developed in the disodium versenate solution showed striking abnormalities, characterized by the repression of root-hair formation and by swelling and deformity of the epidermal cells. Primary wall structure is discussed in the light of this study and the use of the electron microscope.

Glass and plastic houses.

(*See also* 1077a, 1078e, f.)

1049. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Report on the test of "Thermoplus" brand of polythene film of 0·0015 in. gauge used for insulating houses (Part II).
Rep. N.I.A.E. **172,** 1958, pp. 4.

After 2 years in the test glasshouses the condition of most of the film was good enough to last for a further period of use, but there was some mechanical damage round the ventilators and doors. Dirt deposits on the film were not a serious problem. Fixing the film with a hand stapler was satisfactory when cardboard washers were used with the staples. With a plastic lining tomatoes appeared pale and drawn as a result of increased temperature and reduced light intensity. There was some scorching of cucumber growing points, partly due to insufficient ventilation. There was considerable variation in temperature where means of control were unsatisfactory, but many, especially decorative, plants grew well in insulated houses. The danger from "drip" of condensed water vapour may be reduced by arranging it to take place over paths. In cases where complete lining may prove detrimental to the crop, lining the sides and ends of the house may usefully reduce draughts. [For Part I, see *H.A.*, 27: 52.]

1050. MICHEL, K.
Automation im Gewächshausbau. (**Automation in glasshouse construction.**)
Schweiz. Gärtnerztg, 1958, **61** (40): 2-5, illus.

Well illustrated labour-saving devices, chiefly concerned with ventilation and heating and with humidity, light and temperature recording.

1051. GHEORGHIU, H.
Sisteme constructive şi materialele folosite la executarea serelor. (**Systems and materials used in greenhouse construction.**) [English, French, Russian and German summaries.]
Grăd., Via Liv., 1958, **7** (8): 5-9+graphs and summaries.

Existing practice in glasshouse construction in Roumania is reviewed with particular reference to type, site, orientation and materials used. It is suggested that the replacement of steel and wood by plastics should be considered, and to reduce production costs, siting in the vicinity of sources of natural and industrial waste gas or factories producing residual waste heat is recommended.

1052. VOGEL, G.
Betrachtungen zu neueren Bodenheizanlagen. (**Consideration of new soil-heating methods.**)
Dtsch. Gartenb., 1958, **5**: 309-12, bibl. 11, illus.

Steam and electricity as soil heating agents under glass are discussed. At Grossbeeren a system is being developed which combines heating, subirrigation and soil steaming. Low pressure steam is passed along drainage pipes, 0·25–0·35 m. deep and 0·7–0·8 m. apart. Growth of plants in these soils has been satisfactory in spite of variations in soil temperature. The use of steam for soil heating ensures adequate soil moisture. [See also *H.A.*, 28: 2515.] Soil heating by electric cable is better suited to supplementary heating, but with wire-netting as a carrier results have been more satisfactory.—Inst. Gartenb., Grossbeeren.

1053. Boodley, J. W.
Improving heating in the greenhouse.
Bull. N.Y. St. Flower Grs, 1958, No. 156, p. 9, bibl. 1, illus.

The use of aluminium foil behind the heating pipes along the side walls of the greenhouse is described. Considerable savings in heat have been obtained. It is emphasized that an air space should be left between the foil and the greenhouse wall.

Irrigation.

(*See also* 1077k, 1078c.)

1054. Tramel, T. E., Crowe, G. B., and Abel, J. F., Jr.
Irrigation investment and operating costs in the Delta.
Miss. Fm Res., 1958, **21** (5): 3–6, illus.

Based on the 145 farms included in the study reported here, investment in irrigation equipment averaged $73 per acre irrigated for sprinkler systems, $57 for gated-pipe systems, $36 for siphon-tube systems, and $50 for other gravity systems. Average investment for the 145 farms was $56 per acre irrigated. Annual operating costs per acre irrigated averaged as follows: sprinkler systems, $18; gated-pipe systems, $18; siphon-tube systems, $8; and other gravity systems, $12. Average annual costs for all systems amounted to $15 per acre irrigated. [From authors' summary.]

1055. Cavazza, D.
L'irrigazione fisiologica. (**Physiological irrigation.**)
Ital. agric., 1959, **96**: 25-35, bibl. 8.

Calculations of the irrigation requirements of crops are based on curves expressing the cumulative water consumption of the crop and the reserves of soil moisture.

1056. Wells, D. A.
Automatic watering tests on tomatoes.
Grower, 1959, **51**: 125-9, illus.

An automatic watering system is described, which is based on the moisture content of the soil round the plant roots. In trials with tomatoes a controlling tensiometer was used, which has a vacuum switch connected to a porous pot, buried 4 in. deep in the soil, and a vacuum gauge. The vacuum switch was set to operate the water supply when soil moisture tension reached 7 cm. of mercury, and the supply was stopped when water had percolated down to the porous pot. The system may be made more efficient by siting 2 or 3 tensiometers throughout the crop.—Nat. Inst. agric. Engng, Silsoe.

1057. Bilanski, W. K.
Factors that affect distribution of water from a medium pressure rotary irrigation sprinkler.
Diss. Abstr., 1958, **19**: 104, being *L.C. Card No. Mic.* 58-2414 of 133 pp.

It was found that the factors discussed below had the greatest influence in approaching the desired distribution of water. The oscillating arm accentuated the fall-out of water near the sprinkler. A decrease in rate of rotation, an increase in the angle of inclination of the sprinkler nozzle from the horizontal and an increase in the operating pressure all resulted in fall-out of the water approaching the desired distribution pattern. In general, the use of non-circular orifices or of short cylindrical tubes in place of conventional sprinkler nozzles resulted in a more desirable distribution pattern of water. The equilateral-triangular orifices in which the triangular shape extended for a considerable depth into the nozzle resulted in a distribution pattern approaching the ideal. The most desirable pattern was obtained from tube lengths ranging from 2 to 4 diameters. [From author's abstract.]—Mich. St. Univ.

1058. Warren, J. T.
A small greenhouse as a propagating unit.
Gdnrs' Chron., 1959, **145**: 77, illus.

Brief mention is made of an automatic watering device which is regulated by the rate of evaporation. As water evaporates from a ceramic block, so more water is drawn from a small metal chamber containing 2 contact points; when the chamber is empty, the electric current ceases to flow between the contacts and the watering mechanism is operated. The equipment has been used for watering pot plants and ring-culture tomatoes.

1059. G-, G.
Interpretazioni fitopatologiche della irrigazione a pioggia. (**Evaluation of sprinkler irrigation from the point of view of crop health.**)
Inf. fitopat., 1958, **8**: 336-7, illus.

Examples are quoted showing how sprinkler irrigation has reduced certain pests. With few exceptions the incidence of fungus diseases has not been increased by it. In one instance, tomato yields were 25% higher with sprinkler than with furrow irrigation.

Transport.

1060. Henderson, J. M., and Linnenberg, C. C., Jr.
Shifts in rail and truck transportation of fresh fruits and vegetables.
Mktg Res. Rep. U.S. Dep. Agric. **237**, 1958, pp. 52, 35 cents.

Figures are given with particular reference to the period 1951–1954, but with notes on previous trends, on changes in method of transportation of apples, grapefruit, oranges, celery, lettuce, tomatoes and water-melons between the places of production, viz. Florida and California and 13 urban markets in the U.S.A. As between those dates truck [lorry] loads rose 5%, from 171,864 to 181,008 car-lots, whereas rail shipment of the 8 commodities fell 4% from 150,508 to 144,225 car-lots. Much of the change occurred in quite long haulage distances, namely from 750 to 1,500 miles in length. The incidence of the changes is discussed as touching differing commodities and different markets. Among factors which appear to have influenced the change are rising rail charges, and the convenience and speed of truck movement between producer and consumer.

1061. (Johnson, H. B.)
Piggyback trailers for fresh produce.
Agric. Mktg, 1958, **3** (10): 5, illus.

Trials have shown that solid loading of boxes of fruit and vegetables in truck trailers, hauled on flat railway cars, results in ineffective refrigeration. Loads should be channelled to allow air circulation except, possibly, when they consist of large commodities such as cabbage or melons packed in well-ventilated, rigid containers.

1062. East Kent Packers Ltd.
"Covered wagon" cuts costs, time and damage risks.
Comm. Gr, 1958, No. 3282, p. 1089, illus.

By use of a tarpaulin-covered folding trellis fixed to the sides, a loaded lorry can be covered in 1 min., as compared to 40 min. by hand.

Machinery and new devices.

(*See also* 1077c, d, i, j, l, m, y, z, 1078a, d, 1087.)

1063. East African Tractor and Implement Testing Unit.
The "Holt VIII B" weed breaker.
Rep. N.I.A.E. **174 (East Africa)**, 1958, pp. 7, illus.

The machine, which may be fitted to the tractor hydraulic lift, consists basically of 4 sharp blades, welded together at right angles; when in motion the machine rotates, the blades striking the ground in regular succession. When tested under East African conditions it was capable of cutting up and mulching crop residues and weed growth up to 6 ft. tall and 1½ in. thick. It can also crush and bruise much heavier bush growth. The rate of work was about 2 acres per hour.

1064. National Institute of Agricultural Engineering.
Report on test of the "Motohak" garden cultivator.
Rep. N.I.A.E. **183**, 1958, pp. 7, illus.

It proved capable of cultivating down to 9 in. depth (measured from the cultivated soil surface), and the rate of work varied from 51 sq. yd./hr. to 865 sq. yd./hr. The fuel consumption varied from 70 sq. yd./pint to 492 sq. yd./pint and from 0·50 pints/hr. to 1·20 pints/hr. [From author's summary.]

1065. Berg, M. A.
A field plot seeder.
Agron. J., 1958, **50**: 713-14, illus.

Seed is placed in 6 funnels, each discharging over an inverted cone rotating in a shallow pan. A scraper directs the seed from the flat rim of each cone into a grain spout to which a narrow shoe is attached. Any or all of the funnels may be used for fertilizer distribution, and the machine can be used in windy weather, as the deck carrying the cones is shielded. It is tractor-operated by hydraulic lift, and row length may be adjusted between 5 and 100 ft. Seeding depth can also be varied.—A.R.S., U.S.D.A., Bozeman, Montana.

1066. Morrison, G.
Tractor assembly simplifies fumigation.
Amer. Nurserym., 1958, **108** (9): 7-8, illus.

This equipment unrolls a 7-ft.-wide strip of 2 mil polyethylene and automatically seals the sides by turning small furrows of earth onto the edges. Trailing behind the tractor and below the plastic cover are two 8-ft.-long hoses which release methyl bromide as a fumigant.

1067. Moiseev, N. F.
New machines for vegetable growing. [Russian.]
Sad i Ogorod, 1958, No. 12, pp. 25-8, illus., and 1959, No. 1, pp. 20-5, illus.

A description is given of new types of drills and planters; combined manure drills and cultivators; sprayers and dusters; irrigation sprinklers; and seed extractors and graders.

1068. Listov, P. N., and Mjakišev, N. F.
The use of high frequency electric motors for hand implements in vegetable growing. [Russian, with English summary ¼ p.]
Izv. Timiryazev, seljsk. Akad., 1958, No. 4, pp. 157-72, illus.

The general requirements of hand operated, electrically powered horticultural implements are discussed, and a design is given for a soil cultivator/weeder which works to a depth of 5–12 cm. with a width of 12–16 cm.

1069. Purdy, L. H., and Holton, C. S.
Differential corrosion of metals by seed-treatment fungicides.
Phytopathology, 1958, **48**: 508-12, bibl. 2, illus.

Stainless, cold-rolled and carbon steels, as used in the manufacture of seed-treating machines, were tested for corrosion by 10 fungicides. None affected the stainless steel. In the diluted form, MEMA (containing 11·4% methoxyethylmercury acetate), Emmi (10·34% 1,4,5,6,7,7-hexachloro-*N*-(ethylmercuri) bicyclo [2.2.1] hept-5-ene-2,3-dicarboximide), and Metasol M (5·7% methylmercury oxyquinolate) were the most corrosive. The least corrosive were Panogen 42 (6·3% cyano(methylmercuri) guanidine), Ceresan 200 (6% ethylmercury 2,3-dihydroxypropyl mercaptide and 1·3% ethylmercury acetate), Anticarie (40% hexachlorobenzene) and Ceresan M (7·7% *N*-(ethylmercuri)-*p*-toluenesulphonanilide). When undiluted, MEMA was the most corrosive, Panogen 15 (2·2% active principle) was slightly corrosive, and neither Ceresan 75 (2·8% ethylmercury 2,3-dihydroxypropyl mercaptide and 0·6% ethylmercury acetate) nor Emmi was corrosive.

1070. WOTTON, W. I., AND MCLARTY, H. R.
Steam-operated equipment for the partial sterilization of soil, flats and pots.
Canad. J. Plant Sci., 1958, **38**: 424-9, bibl. 1, illus.

The equipment described consists of two units with a common source of steam. In one unit, soil is sterilized by allowing soil particles to fall through steam in a rotating drum. Output is about 1 cubic yard of soil per hour. In the second unit flats and pots are sterilized by 3 minutes' exposure to steam. Fungi and non-spore-forming types of bacteria are killed. The equipment is inexpensive and easily built. [Authors' abstract.]—Plant Path. Lab., Summerland, B.C.

1071. LEASURE, J. K., AND FALKENSTEIN, W. J.
A logarithmic concentration sprayer for small plot use.
Down to Earth, 1958, **14** (3): 2-5, bibl. 2, illus.

The small but versatile sprayer described here, which is mounted on a frame on bicycle wheels, has been evolved from the unit described by Pfeiffer *et al.* [*H.A.*, 26: 114]. It can be used for research on pesticides and herbicides in orchards and field plots or with potted plants set at measured intervals. When run along a given row of plants or around a particular tree it can be adjusted to apply steadily decreasing concentrations of a chemical or the same total concentration of two chemicals in steadily changing proportions. Alternatively, where two chemicals are applied in combination, the concentration of one of them can be kept steady while that of the other one is altered. In this way it is possible to determine the range of concentrations within which insects, weeds, etc., can be controlled and also the limits within which no injury to plants occurs.—Dow chem. Co.

1072. SHELL CHEMICAL COMPANY.
Increased plant growth from polystyrene pots.
News Release Shell Chem. Co., 1958, pp. 2, illus.

It is claimed that in polystyrene flower pots plants produce a greater number of shorter roots, and thus have a greater capacity for nutrient absorption than plants in clay pots. Watering is also reduced, soil temperatures are 1–4° F. higher than in clay pots, and sterilization after use is not necessary.

1073. PELLIZZI, G.
Macchine nella produzione e per l'impiego delle sementi. Un apparecchio per la preparazione diretta di quantità equiponderali di semi. (**Machines in the production and handling of seeds. An apparatus for direct preparation of seeds in quantities of equal weight.**)
Sementi elette, 1958, **4** (5): 63.

The apparatus, designed for filling seed packets, consists of a small hopper, a cylinder of variable internal capacity, a small electric motor, and a delivery channel.

1074. BROWNE, D. A.
A semi-automatic seed counter.
J. agric. Engng Res., 1959, **4**: 72-3, illus.

An electromagnetic register is operated by a switch in the handle of the feeler used for moving the seed from one heap to another. The circuit of the apparatus is shown.

1075. DONOVAN, L. S., MAGEE, A. I., AND KALBFLEISCH, W.
A photoelectric device for measurement of leaf areas.
Canad. J. Plant Sci., 1958, **38**: 490-4, bibl. 6, illus.

Leaves are placed between a fluorescent light source, high in the red spectrum, and a photocell covered with an F29 red light filter. The reduction in output of the cell, as measured by a galvanometer, is interpreted in terms of area. [From authors' abstract.]—Canada Dep. Agric., Ottawa.

1076. VAN DIE, J.
Pressing out leaves with the aid of centrifugal force: a method for a rapid quantitative isolation of the free amino-acids.
Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1958, **61**: 454-60, bibl. 5, illus.

The apparatus is described. The free amino acids from cucumber leaves were quantitatively estimated within 40 min. of sampling.—Centre Plant Physiol. Res., Wageningen.

Noted.

1077.
a ANON.
Der neue Gysi-Plastikblock. (**The new Gysi plastic house.**)
Schweiz. Gärtnerztg, 1958, **61** (41): 3, illus.
Prefabricated with lights 3, 4 or 5 m. long.

b ANON.
Fruit and vegetable production in Cyprus.
Countryman, Nicosia, November, 1958, pp. 16-17, reprinted from *Int. Fruit World.*
Production figures and trends in recent years.

c ANON.
New planter increases production in nursery.
Amer. Nurserym., 1958, **108** (9): 11, illus.
Driver and 4 men can plant 22,000 plants per 10-hour day.

d BAUMGART, M. G.
Controlled intermittent mist for plant propagation.
N.Z. J. Agric., 1958, **97**: 31-4, illus.
The design and working of a system suitable for New Zealand conditions.

e BRIAN, P. W.
Effects of gibberellins on plant growth and development.
Biol. Rev., 1959, **34**: 37-84, bibl. 212.
A comprehensive review.

f BÜNSOW, R.
Anwendungsmöglichkeiten der Gibberelline. **(Possible applications of gibberellins.)**
Angew. Bot., 1958, **32**: 186-96, bibl. 59.
A review.

g BURRIEL MARTÍ, F., JIMÉNEZ GÓMEZ, S., AND RODRÍGUEZ DE LA PEÑA, M.
Determinación de boro en suelos y plantas. I. Método colorimétrico de análisis. **(Determination of boron in soils and plants. I. Colorimetric method of analysis.)** [English summary 6 lines.]
An. Edafol. Fisiol. veg., 1958, **17**: 565-86, bibl. 87.

h COHN, N. S., AND MERZ, T.
A technique for the sterile culture of roots.
Nature, 1959, **183**: 412-13, bibl. 4.
Covers the composition of the medium used.

i COSTES, C.
Séparation et dosage des carotenoides foliaires par chromatographie sur cellulose. **(Separation and determination of leaf carotenoids by chromatography on cellulose.)**
Ann. agron., 1958, **9** (Suppl.): 35-48, bibl. 11.
Including tomato and tobacco as test plants.

j DAY, B. E.
A simplified logarithmic plot sprayer.
Weeds, N. York, 1958, **6**: 441-6, bibl. 1, illus.
A further development of the machine designed by Pfeiffer *et al.* [see *H.A.*, 26: 114 and also abstract 1071].

k DUFFIN, R. B.
Sprinkler irrigation in Oklahoma.
Circ. Okla St. Univ. Ext. Serv. **632**, [?1958], pp. 16, illus.
Including types of suitable equipment and overall costs.

l EVRARD, R.
Aperçu des méthodes indirectes d'appréciation des propriétés germinatives des semences. **(Review of indirect methods of estimating the germinating power of seeds.)**
Ann. Gembl., 1957, **63**: 253-67, bibl. 18, illus.
Particularly colorimetric methods.

m GROGAN, C. O., AND ZUBER, M. S.
A new method for labeling seed envelopes.
Agron. J., 1958, **50**: 716-17, illus.
An addressograph machine is used on seed envelopes for randomized trials.

n HENDRICKS, S. B.
Photoperiodism.
Agron. J., 1958, **50**: 724-9, bibl. 11, illus.
A review.

o HOLME, F.
Horticultural cropping in Scotland.
Scot. Agric., 1958, **38**: 118-20.
Acreage figures for vegetables, small fruits and rhubarb.

p HUGHES, C., AND SPRAGG, S. P.
The inhibition of mitosis by the reaction of maleic hydrazide with sulphydryl groups.
Biochem. J., 1958, **70**: 205-12, bibl. 27.
In pea seeds treated with MH, which germinated but stopped growth when cell division succeeded cell enlargement.

q HUNTER, A. W. S., AND SAMPSON, D. R.
Genetic studies with horticultural plants in Canada.
Reprinted from *Proc. Genet. Soc. Canada*, 1958, **3**: 35-40, bibl. 44.
A review with sections on vegetables, fruits, ornamental plants and radiation.

r JAKOVLEVA, V. V., AND MININA, E. I.
On the physiological rôle of molybdenum in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **121**: 179-81, bibl. 9.
From pot experiments with clover and lettuce it was concluded that Mo plays an important part in both nitrogen metabolism and redox system.

s MANSHARD, E.
Über das Sorptionsvermögen von Quarzkies, Bimskies und Vermiculit für Phosphat-, Kalium- und Ammonium-Ionen und die Aufnahme der sorbierten Ionen durch Pflanzen. **(On the sorption capacity of quartz gravel, pumice stone gravel and vermiculite for phosphate, potassium and ammonium ions and the uptake of the absorbed ions by plants.)**
Gartenbauwiss., 1958, **23**: 308-26, bibl. 14., Studies on media for soilless culture with oats as test plants.

t Matsumoto, K., Nagasaka, K., and Nakamura, R.
Studies on the respiration of fruits and vegetables. Apparatus for determination of the rate of respiration. [Japanese, with English summary 34 lines.]
Stud. Inst. Hort. Kyoto, **8**: 74-9, bibl. 9.
The authors use a modification of that used by Claypool and Keefer (*Proc. Amer. Soc. hort. Sci.*, 1942, **40**: 177-86).

u Mayer, R.
Le contrôle de l'identité variétale et la certification des semences en France. (**Checking of varietal identity and certification of seeds in France.**)
Reprinted from *Proc. int. Seed Test. Ass.*, 1957, **22** (1), pp. 8.

v Ministry of Agriculture, London.
Seed and potting composts.
Adv. Leafl. Minist. Agric., Lond. **471,** 1958, pp. 5.
Composts for different plants and stages of growth.

w Morel, G.
Nouveaux régulateurs de croissance. (**New growth regulators.**)
Ann. Agron., 1957, **8** (Suppl. II): 167-89, bibl. 75, illus.
Action of kinetins and gibberellins is reviewed.

x Muzik, T. J., and Lawrence, J. M.
Separation of specific and non-specific effects of chemicals on plants.
Nature, 1959, **183**: 482, bibl. 4.
See *H.A.*, 29: 368.

y National Institute of Agricultural Engineering.
Report on test of the Bomford "Warwick" hedgemaker.
Rep. N.I.A.E. **188,** 1958, pp. 10, illus.
Tractor attachment performed best on well-maintained hedges and more slowly but well on neglected hedges.

z Paquin, R., and Coulombe, L. J.
A simple method for measuring the area of leaves of potted plants.
Canad. J. Bot., 1959, **37**: 167, bibl. 1.
A device for holding attached leaves during photographic printing.

1078.

a Partanen, C. R., and Gifford, E. M., Jr.
Application of autoradiographic techniques to studies of shoot apices.
Nature, 1958, **182**: 1747-8, bibl. 7, illus.
Localization of nucleic acid synthesis by using inorganic P^{32} as the labelling substance.

b Pratelli, G.
Edifici aziendali per la conservazione di frutta e ortaggi. (**Commercial storage buildings for fruit and vegetables.**)
Frutticoltura, 1958, **20**: 641-55, bibl. 14, illus.
A review, covering European countries and the U.S.A.

c Rego, Z. J. P. de C., and Estácio, F. L. F.
Determinação das necessidades de água para rega. (**Determination of irrigation requirements.**)
Rev. agron. Lisboa, 1957, **40**: 31-47, bibl. 17 [received 1958].
A review, including results for vegetables, peas, citrus, deciduous tree fruits and tomatoes.

d van t'Sant, G. F.
Kunststofinrijder. (**Machine for laying plastic strips.**)
Fruitteelt, 1958, **48**: 1188, illus.
Unrolled from a 2-wheel tractor which covers the edges with soil.

e Seidel, E.
Einführung eines einheitlichen Gewächshaustyps in die gärtnerische Produktion. (**The introduction of a multispan glasshouse into horticultural production.**)
Dtsch. Gartenb., 1958, **5**: 264-6, illus.
The advantages of 2 types developed in Germany.

f Sheldrake, R., Jr.
More greenhouse space . . . at low cost.
Amer. Veg. Gr, 1958, **6** (12): 10-12, 24-5, illus.
Plastic house construction, types of plastic, ventilation and heating.

g Silow, R. A.
The potential contribution of atomic energy to development in agriculture and related industries.
Reprinted from *Int. J. appl. Rad. Isot.*, 1958, **3**: 257-80, bibl. 10.
In plant breeding, nutrition and protection.

h Stansfield, G. H.
Prepacking of fresh fruit and vegetables.
Agriculture, Lond., 1958, **65**: 384-7, illus.
A review including types of produce, types of pack, mechanization and distribution.

i Thompson, D. L.
Labeling seed envelopes using punch card equipment.
Agron. J., 1958, **50**: 717, illus.
For statistical trials, at 100 envelopes per min.

j VENEMA, K. C. W.
Influence of light on the potash requirements of plants.
Potash and trop. Agric., 1958, **1**: 23-36, bibl. 22.

k ZEEVAART, J. A. D.
Gibberellazuur en mogelijkheden voor toepassing. **(Gibberellic acid and its possible uses.)** [English summary 12 lines.]
Meded. Dir. Tuinb., 1958, **21**: 589-96, bibl. 9, illus.

A review of similar scope to that noted in *H.A.*, 28: 2147j.

l ZEEVAART, J. A. D.
Flower formation as studied by grafting. [Dutch summary 2 pp.]
Meded. LandbHogesch. Wageningen, 1958, **58** (3): 1-88, bibl. 163, illus.

A fuller account of work abstracted in *H.A.*, 28: 17, 18, 2077 and 2078.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 1060-1062, 1077b, q, t, 1078b, 1175g, j, p, r, 1176j, l-n, 1873, 1989, 2001, 2014, 2018b, d-f.)

1079. RUMBEKE-BEITEM (WESTVLAAMSE PROEFTUIN).
Verslag Westvlaamse Proeftuin, Rumbeke-Beitem, 1955. **(Report of the West Flanders Experimental Garden, Rumbeke-Beitem, Belgium, for 1955),** pp. 40, illus. [received 1958].

Results from studies on the following are briefly reported: effect of windbreak and a straw mulch on pears; comparison of a permanent grass cover and clean cultivation with apples; rootstock studies with apples and plums; apple tree forms; apple trials with commercial varieties; observations on apple and plum diseases; improving fruit colour of apples; and frameworking apples.

1080. RUMBEKE-BEITEM (WESTVLAAMSE PROEFTUIN).
Verslag Westvlaamse Proeftuin, Rumbeke-Beitem, 1956. **(Report of the West Flanders Experimental Garden, Rumbeke-Beitem, Belgium, for 1956),** pp. 40, illus. [received 1958].

Studies have been continued on: wind shelter and straw mulching for pears; comparison of permanent grass and clean cultivation for apples (including rootstocks) and pears; rootstocks for apples; variety trials with commercial apples and pears; pruning Jonathan trees; improving apple fruit colour; frameworking apple trees; and pre-cooling for apples and pears.

1081. SEBBEL, H., BOCKWOLDT, D., AND RECCIUS, W.
Bericht über die 10-jährige Tätigkeit des Obstbauberatungsringes für das Land Schleswig-Holstein e.V., Seestermühe. **(Report on the first 10 years of the advisory service in fruit growing, Seestermühe, for Schleswig-Holstein),** Verlag Ursula und Carl-Heinz Maass, Pinneberg, 1958, pp. 89, illus.

In this anniversary booklet the authors survey the development in fruit (chiefly apple) growing in the Schleswig-Holstein area. This is described in sections on tree forms, varieties and planting systems, pest control, soil management and manuring, pruning, storage, and fruit shows. In one chapter the experimental farm at Kollmar is described, and results from trials on soil management, manuring, rootstocks and interstocks are summarized.

1082. MINISTRY OF AGRICULTURE, LONDON.
Intensive apple culture.
Bull. Minist. Agric., Lond. **49,** 5th edition, 1958, pp. 38, illus., 4s.

The last edition of this bulletin appeared in 1938 and it has now been rewritten in the light of research results and practical experience during the intervening 20 years. Emphasis is rightly placed on site selection, in view of the high capital costs involved. The three pruning and training systems used commercially, viz. cordon, dwarf pyramid and dwarf bush, are clearly described with diagrams. Other aspects of intensive apple growing are considered under rootstocks, varieties, soil management and manuring, marketing, machinery, and pest and disease control.

1083. WALLACE, D. B., AND PLAISTER, A. J.
Apple production. A grower's guide to costs and returns.
Mimeo. Rep. Univ. Cambridge Sch. Agric. **56,** 1958, pp. 20, bibl. 7, 2s. 6d.

On the basis of an orchard survey in East Anglia, graphs (for culinary and dessert apples) are shown, by which growers can estimate the likely price/yield relationships necessary to cover direct costs and to provide a surplus of £70 per acre over these costs. The future outlook for home produced apples is considered.

1084. BOOGERD, D., AND VAN WELY, A. J. M.
De standcijfers en de produktieschatting van appelen. **(Crop figures as a basis for estimating apple production.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1958, **21**: 477-83.

Crop estimates are provided twice a month to give an indication of production in the fruit and vegetable growing areas of Holland. The figures vary from 0 to 100, with 70 being considered as good. Estimation of the actual apple harvest from May figures is generally rather high, but using

June figures a fairly accurate estimation can be obtained.

1085. GERRITSEN, C. J.
De teelt van abrikozen. (**Apricot culture.**)
Meded. Inst. Vered. Tuinbouwgew. **130**, 1958, pp. 23, bibl. 26, illus.

Since 1950 the possibility of commercial apricot growing in the Netherlands has been studied. The greatest obstacle to increased cultivation is earliness of flowering. Apricot growing is not difficult, as there are many suitable soils, pruning is not complicated and not much disease control is required. Studies on the most suitable varieties and stocks are in progress, and possible future trends for research are discussed.

1086. MICHIELI, I.
Prospettive dell' esportazione della frutta fresca con particolare riguardo alle pesche. (**Review of fresh fruit exports, with special reference to peaches.**)
Agric. Venezie, 1958, **12**: 619-42.

Production figures are quoted for apples, pears, apricots, cherries, plums and peaches in Belgium, France, Germany, Italy and Holland (separately and as the Common European Market group), in the OEEC area, and in the world, from 1934-55. Italian export figures are given for 1950–57, for peaches, apples, pears, cherries, apricots, citrus fruits and grapes, with further details of earlier years and of inter-European trade in peaches.

1087. SCHNEIDER, G. W., WALKER, D. R., AND CORRELL, F. E.
A controlled temperature chamber for hardiness studies with fruit trees.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 23-6, bibl. 2, illus.

The construction of a small (6 ft.×6 ft.×3 ft.) insulated moveable chamber is described, in which winter field conditions may be simulated. The controls allow constant temperature, increased or decreased temperature continually or intermittently, and constant or changing rates of temperature change for a given run. Control is automatic for up to 7 days, but may be continued for any length of time by resetting.—N.C. agric. Exp. Stat., Raleigh.

Varieties and breeding.

(*See also* 1175b, k-m, u, 1176b, c, f, q-s.)

1088. BALSGÅRD (NYBOM, N., BERGENDAL, P. O., AND OLDÉN, E. J.)
Föreningen för Växtförädling av Frukttträd. Verksamhetsåret 1957. (**Annual Report of Balsgård Fruit Breeding Institute for 1957.**) [English summary 3 pp.], 1958, pp. 24.

The main aim of the apple breeder is to obtain better late winter varieties. Two promising selections are a very early red summer apple, and a high quality red apple ripening during December to February. Cherry breeding is concerned with the production of late-ripening varieties, and plums are being hybridized for increased earliness, or extreme lateness, combined with good transport qualities. Disease resistance, yield, appearance, quality and suitability for transport and processing are the main aims in strawberry breeding. Sixteen new rootstock clones are to be tested with Cox. Laboratory studies include chromosome counts, stability of vitamin C in various apple varieties and the induction of mutations by X-rays and gamma-rays.

1089. KLEIN, L. G.
The inheritance of certain fruit characters in apple.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 1-14, bibl. 21.

Evaluation of large seedling populations from crosses between several dessert varieties showed that the factors transmitting small fruit sizes tended to be dominant to those producing large sizes, and that factors producing round or oblate-shaped fruits were dominant to those which transmit length to fruits. All of the red varieties studied were apparently heterozygous for colour. Red striping was dominant to the blush or wash type of colour, and in several crosses between red striped varieties there was a 3: 1 ratio between red streak and red blush (or lacking colour). Red Spy in several combinations produced progeny with typical Northern Spy streaking. The genes which produce sweetness were recessive to those producing acidity in the crosses studied. Both flavour and quality are difficult to study genetically, but it was unusual for a seedling to possess quality as high as that of its best parent.—N.Y. St. agric. Exp. Stat., Geneva.

1090. GHILLINI, C. A.
Sterilità in meli Abbondanza per anomalia ad eziologia incerta. (**Anomalous sterility of unknown origin in Abbondanza apples.**) [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1958, **42**: 437-42, bibl. 7, illus.

In an orchard of healthy Abbondanza apples, two trees repeatedly produced spring growth with dwarfed leaves and small sterile flowers. Their vegetative growth approached normal as the season progressed, but no fruit was ever set. Scions from these trees retained their abnormalities when grafted on normal trees, and scions from normal trees were unaffected by grafting on the sterile trees. Possible causes of the anomaly are either a new virus, or, more probably, a bud mutation.

1091. TAYLOR, J. W.
Mutations of late maturity in peaches and nectarines.
Fruit Var. hort. Dig., 1958, **13**: 3-5, bibl. 1, illus.

Three mutations found in California on an Elberta and a Rio Oso Gem peach tree and on a Le Grand nectarine tree are described briefly. In each case fruits of the mutations matured about 1 month later than those of the parent variety, but were characterized by a narrow section of flesh along the ventral suture which ripened at the same time as the fruit of the parent trees. Seedlings of the 3 mutations produced fruits with a range of ripening dates from early August to mid-October; a few, in fact, failed to ripen at all. The fruits of these seedlings did not have early-ripening sutures.

1092. Plock, H.
Ein Verfahren zur Bestimmung von Aprikosensorten. **(A method of identifying apricot varieties.)**
[*Publ.*] *Minist. Landw., Weinb., Forst. Rheinland-Pfalz*, 1958, pp. 39, illus.

Methods are described for the identification of apricot varieties by reference to coloured illustrations and an attached colour scale, to various characteristics of the stone, and to imprints made of the leaf and of the cut stone. The process is illustrated by application to 6 varieties commonly grown in the Palatinate.

1093. Plock, H.
Die Bestimmung von Aprikosensorten mit Hilfe des Fruchtsteines. **(The identification of apricot varieties by means of their stones.)**
Wissenschaft. Schriftenreihe AID, 1958, No. 16, pp. 35, bibl. 4, illus.

In this valuable monograph the author stresses the particular importance of the stone for the identification of species and varieties of apricot giving exact illustrated descriptions of the stones of 10 forms of *Prunus armeniaca*, and of 5 "Millionair" rootstock types of *P. armeniaca* and of some 20 well known apricot varieties in southern Germany.

Propagation and rootstocks.

(*See also* 1175n, 1176a, d, i, 1659-1662, 1664, 1991.)

1094. Preston, A. P.
Apple rootstock studies: Thirty-five years' results with Worcester Pearmain on clonal rootstocks.
J. hort. Sci., 1959, **34**: 32-8, bibl. 9.

The growth and cropping of Worcester Pearmain on 13 clonal rootstocks, up to the age of 35 years, are reported. Trees on Malling IX, M.VII, M.IV, M. I, M.II and M.XVI are dealt with in detail. The relative order for the 6 main rootstocks for tree size was established by the 15th year. The order for cropping was established by the 25th year, with the exception of trees on M.XVI which fell into their present position 5 years later. Trees on most rootstocks bore their heaviest crop at or about the 28th year. Half the number of trees on each rootstock were unpruned during the first 8 years, after initial heading back. Henceforth all were pruned alike. The "unpruned" trees were larger than the pruned ones during the first 10 years, and during the next 10 years with the exception of trees on M.XVI. The "unpruned" trees produced the heavier crops throughout the trial with the exception of those on M.XVI during the last 5-year period. Estimated acreage yields are shown, based upon accumulated crop per tree at appropriate spacing for trees on different rootstocks. These favoured trees on rootstocks of dwarfing and intermediate vigour. The results are discussed in relation to those reported earlier [see *H.A.*, 28: 1102 and 3307] for Lane's Prince Albert and Cox's Orange Pippin on similar rootstocks. [Author's summary.]—E. Malling Res. Stat., Kent.

1095. Schulz, F.
Spezielle Vorspannbeobachtungen. **(Special observations on nurse roots.)**
Mitt. Klosterneuburg, *Ser. B*, 1958, **8**: 255-7, bibl. 2.

The data presented describe the effects of M.XI and M.XVI as nurse roots on girth and yield of Boskoop and Croncels spindle bushes on M.IX growing in a sandy soil. The operation made it possible to increase the vigour of the scion varieties and to control their growth in general. The influence of nurse roots on own-rooted scions is suggested as a field of study for rootstock research.—Inst. Obstb. Berlin.

1096. Cripps, J.
The raising of seedling apple rootstocks.
J. Agric. W. Aust., 1958, **7**: 471-2, illus.

The following recommendations are applicable to Western Australia:—Seed should be stored in the fruit, or removed from it and kept in moist sand in polythene bags at 32° F. to 40° F. during the early winter, and sown in early August in rows 3 ft. apart. The seeds are best sown 2 in. apart in the row and thinned later to 6 in. In January or February the seedlings are budded. The budded plants are transplanted the following winter and cut back in the spring. J.R.L.

1097. Hsu, C. S., and Hinrichs, H. A.
Rooting response of dwarf apple cuttings under intermittent mist.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 15-22, bibl. 12, illus.

Actively growing leaf-bud and stem cuttings of M.VII, M.IX and Clark were successfully rooted under high temperatures and intermittent mist. Equal parts of builders' sand and peat provided the best rooting medium; sand plus peat or perlite was better than sand alone. In general rooting in the greenhouse was better than under polythene, as a result of better ventilation. The high temperatures during rooting often resulted in yellowing and shedding of the leaves, which resulted in reduced rooting. Leaf-bud cuttings rooted better than stem cuttings, but their subsequent growth was slower. Stem cuttings are therefore preferred for rapid propagation. IBA at 0·3% gave the highest percentage rooting and the heaviest roots. Wounding was beneficial in promoting rooting of softwood cuttings.—Okla St. Univ., Stillwater.

1098. Duhan, K.
Die Verwachsung von Birnenveredlungen auf Quitte nach gewöhnlichem Okulieren und Nicolieren. **(The union of pears on quince after ordinary budding and after double shield budding according to Nicolin.)**
Dtsch. Baumsch., 1958, **10**: 299-308, illus.

Careful examination of 2- to 4-year-old pears on Quince A led to the conclusion that the trees form a firm union after double-working according to Nicolin [*H.A.*, 23: 3813], even though scion variety and rootstock are somewhat incompatible. Photographs of histological slides of pear unions are provided.

1099. Gerritsen, J. D.
Is Beurré Hardy wel een goede tussenstam? **(Is Beurré Hardy really a good interstock?)**
Fruitteelt, 1958, **48**: 914-15, illus.

In a 20-year-old pear orchard of Clapp's Favourite and Triomphe de Vienne growth was more vigorous and yields were higher when Vicar of Winkfield was the interstock than when Beurré Hardy was used. Further studies are required.

1100. Tarasenko, M. P.
Changes in certain characters of cherry caused by the rootstock. [Russian.]
Agrobiologija, 1958, No. 5, pp. 127-9.

In the Ukraine 3 new cherry hybrids were most susceptible to frost on wild cherry, less on mahaleb and least on sour cherry. While the sour cherry rootstock had a slightly unfavourable effect on fruit size and composition, compared with the other rootstocks and self-rooted trees, its use for the development of frost resistant varieties for the more northerly areas is recommended.

1101. Avent, K. L.
Trees in a hurry.
Vict. hort. Dig., 1958, **3** (3): 7-8, illus.
From peach pit to headed tree in one year?
Fruit World, Melbourne, 1958, **59** (10): 42.

Seeds were planted out from July to September, and were large enough to be budded by November or mid-December. There was a high percentage of successful bud "takes". Plastic ties were easier to use than raffia.

1102. Harrison, T. B.
Note on the vegetative reproduction of peach cuttings.
Canad. J. Plant Sci., 1958, **38**: 515-16, bibl. 5, illus.

Firm softwood peach cuttings were struck in sand or perlite after wounding and dipping in 1,000 p.p.m. IBA solution for 2 seconds. Excellent turgidity was maintained in an air conditioned mist tunnel and rooting occurred within 3 weeks. Root damage during transfer to the greenhouse was eliminated by using peat pots containing perlite for each cutting.—Canada Dep. Agric., Harrow, Ont.

1103. Hirai, J., Nakagawa, S., and Nanjo, Y.
Growth of peach seedlings as affected by peach bark added to the soil and some other soil treatments. [Japanese, table legends and summary, 20 lines, in English.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 32-7, bibl. 9.

The addition of 10% water extract of peach root bark to Hoagland's solution in one-gallon glazed crocks inhibited growth in sand-cultured peach seedlings. Fumigation of the bark treated soil did not mitigate this effect but it was removed by heat treatment.

1104. Hirano, S.
Studies on peach sick soil. III. On the toxic substances in peach root. [Japanese, with English summary 25 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 27-31.

Growth of 1-year-old peach plants was superior in pots in which the culture solution was allowed to leach out and was not replaced to that in pots where the leachate was returned to the pot. [See also *H.A.*, 28: 2315.]

1105. Hansen, C. J., and Hartmann, H. T.
Propagation of temperate-zone fruit plants.
Circ. Calif. agric. Ext. Serv. **471**, 1958, pp. 51, illus.

Crops include both true temperate-zone fruits and olives, persimmons, pecans, and soft fruits. Instructions are given on propagation by budding, grafting, cuttings, layering, suckers and runners, and on rootstock selection for top fruits.

Winter hardiness.

1106. Karnatz, H.
Untersuchungen über die Frostresistenz der Obstgehölze im Baumschulstadium. IV. Über die wechselseitige Beeinflussung der Frostresistenz zwischen Unterlage und Edelreis beim Apfel. **(Studies on the frost resistance of fruit trees in the nursery stage. IV. On the mutual effect of frost resistance between stock and scion in apples.)**
Züchter, 1958, **28**: 323-8, bibl. 8.

Winter hardiness during 1956/57 was observed in 3-year-old trees with 7 stocks grafted to Cox. Hardiness in early winter (November/December) was in some cases opposite to that later (January/March). In early winter M.IX was one of the hardiest stocks and M.XVI was the most severely damaged, while later the situations were reversed. In general the more vigorous stocks (M.XVI, A2, Graham's Seedling, and M.XI) showed less winter injury than dwarfing stocks (M.IV, M.VII and M.IX). The classification of ungrafted stocks was the same as that of grafted stocks, although injury was slightly more severe. [For Part III see *H.A.*, 27: 101.]—ObstVersuchsanst., Jork.

1107. Vuorinen, J.
Maaperän merkityksestä omenapuiden talvenkestävyydelle. (**The influence of soil properties on winter hardiness of apple trees.**) [English summary 2 pp.]
Maataloud. Tutkimuskesk. Maantutkimuslait. agrogeol. Julk. **69**, 1958, pp. 32, bibl. 7.

The resistance to winter injury of Lobo and Wealthy trees on Antonovka and Normandie seedling stocks has been studied in an experimental orchard with a 5% slope to the south. The effect of rootstock was negligible in comparison with that of soil factors. Winter resistance was found to increase by 8% with each rise in soil level of 1 m. Top-soil characters had more influence on winter resistance than had deeper layers. The moisture content of the soil in late summer markedly affected winter resistance, since increasing the soil moisture increased the injurious effect of the descending slope. An increase in exchangeable Ca and readily available N seemed to lessen winter resistance. Potassium had a beneficial effect on winter resistance, and there were indications that P may also be beneficial. Statistically significant correlations were found between winter resistance and total amounts of Cu, V and Mn, but further studies on the effect of these minor elements are required.

1108. Head, G. C.
Some effects of temperature on the frost resistance of apple flowers.
J. hort. Sci., 1959, **34**: 1-6, bibl. 11, illus.

Experiments are described in which potted apple trees, in the process of opening their blossoms, were given 2 different temperature regimes for a week or more before being subjected to artificial freezing. The results show that in the variety Ellison's Orange the cool temperature treatment reduced the rate of development of the blossoms, ultimately producing smaller flowers with a lower water and higher sugar content than those from the warm treatment. The flowers from the cool treatment were always less damaged by artificial freezing than those from the warm treatment. The results are discussed in relation to theories of frost resistance. [Author's summary.]—E. Malling Res. Stat., Kent.

1109. Tomaszewski, M.
Das Phenol/Phenoloxydase-System der Blätter einiger Obstgehölze und seine Beziehung zur Winterruhebereitschaft. (**The phenol/phenoloxidase system in the leaves of certain fruit trees and its relation to the entry into winter rest.**)
Flora, Jena, 1957, **145**: 146-66, bibl. 78, illus., from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. p. 43.

A study has been made of the activity of phenoloxidase in peach, almond, apricot, sweet and acid cherry, pear, quince, plum and apple leaves in relation to the frost resistance of the trees. The enzyme is apparently of importance for the entry into winter rest, varieties with a high frost resistance showing a greater phenoloxidase activity than those with a lower resistance.—Inst. Dendrol. Pomol., Polish Acad. Sci., Kórnik.

1110. Sevast'janova, L. A.
Developing frost resistance in pear hybrids at early stages of development. [Russian, with English and German summaries.]
Vestn. s.-h. Nauki, 1956, No. 3, pp. 65-72, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,987.

Work on the development of frost resistant varieties of pear at Mičurinsk is being carried out by means of directed training together with sexual and vegetative hybridization. Frost resistant mentors [rootstocks] for pears are the Ussurian pear, hawthorn and black-fruited mountain ash. Frost resistance was improved by low temperature treatment of both seed and young seedlings and by short-day treatment of seedlings. [No figures are given.]

1111. Dostálek, J.
Zmrzání a přechlazování květů ovocných dřevin. (**The freezing and supercooling of fruit tree blossom.**) [English, Russian and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 983-98, bibl. 21, illus.

During 1953-1955 laboratory studies were conducted on frost resistance in apple, pear, plum and sweet and sour cherry flowers. Differences in resistance between the species were small, being most apparent at temperatures when injury commenced, while temperatures causing complete loss were practically the same (around —4° C.). Initial critical temperatures were most harmful to cherries; at —2·1° to —2·5° C. about ⅓ of the flowers were injured or killed. At the same temperature range only about 10% of the pear and plum blossom was affected. Apple blossom was practically undamaged down to —3° C. Differences in resistance between varieties were relatively small, and, while even small differences can determine the size of yield, they were considered of little importance in regional recommendations or breeding. During cool weather blossom was more resistant to critical low temperatures than when warm weather preceded flowering. Flowers with even a small piece of shoot froze at critical temperatures while detached flowers were supercooled. Ripe, dry apple pollen remained undamaged at —79·5° C.

1112. Šiškin, I. V.
Fruit growing in the Karelian ASSR. [Russian.]
Sad i Ogorod, 1958, No. 12, pp. 36-41, illus.

While the mean annual temperature of Karelia is lower than that of Central Russia, the absolute minimum temperature is lower in the latter area and the average duration of hard frost longer. Soft fruits, namely currant, raspberry, gooseberry and strawberry are grown throughout. Of tree fruits, apple and, more rarely, pear and plum occur in the central and southern areas, there being also a cherry orchard on Valaam Island. Varieties suitable for the different areas are given.

Growth phenomena.

(*See also* 1175e, o, w.)

1113. Kemmer, E.
Stadienbeobachtungen an Kernobstgehölzen. **(Observations on the phases of pome fruit trees.)**
Züchter, 1958, **28**: 367-77, bibl. 19, illus.

Again [see *H.A.*, 25: 1323] Kemmer's article is not so much a scientific paper, built up and concluded in the usual manner, as an attack on the apostles of the theory of fixed juvenile (sterile) and adult (fertile) phases in the development of pome fruit trees. His arguments are reinforced by 14 well-chosen illustrations which suggest that the rules postulated by his opponents have too many exceptions to be valid as they stand. In addition to the theoretical interest of the issue there is also the important practical question: After what time may we hope to test the first fruit of newly bred apples and pears? On this problem Kemmer is much more optimistic than, for instance, Kobel [see *H.A.*, 24: 3286], who identifies himself with Fritzsche's rigid system of sterile and fertile zones [*H.A.*, 18: 1626]. New observations and pictures presented by Kemmer on apples include: Shortening of the period which a seedling needs to reach the flowering stage, flower formation in the so-called juvenile zone, rooting and flowering of stooled shoots from juvenile and adult zones, and many others. Among the experiments carried out on pears a new technique seems promising, namely the administering of a "sawing shock" to stem or branches, the thickness of the blade and the depth of the wound to be chosen according to the age of the wood and to the effect that it is desired to produce. The operation, which can be repeated annually if the wound is narrow and fairly shallow, is carried out in May or June. It stimulates the formation of shoots from dormant buds situated in either the so-called juvenile or adult zones.—Inst. Obstb. tech. Univ. Berlin.

1114. Zeller, O.
Über die Jahresrhythmik in der Entwicklung der Blütenknospen einiger Obstsorten. **(On the annual rhythm in the development of the flower buds of some fruit varieties.)**
Gartenbauwiss., 1958, **23**: 167-81, bibl. 19, illus.

The flower buds of fruit trees were found to show an individual rhythm characteristic of each variety, differentiation in summer and renewed activity in spring beginning at different times. In each case there existed a correlation between bud formation on the spur in spring and the beginning of flower differentiation in summer. In most cases the developmental stage at which the flower buds entered winter rest was also a varietal characteristic. At the beginning of winter most of the Pomoideae buds studied were at the stage of carpel development, while a sour cherry already had its pollen mother cell and ovule primordia formed; the differentiation of sex cells followed in spring. The reduction division occurred in the pollen mother cells about 3 weeks before bud burst, and in the embryo sac mother cells a few days before flowering.—Landw. Hochsch. Stuttgart-Hohenheim.

1115. Feucht, W.
Die "Übergangsknospen" der Sauerkirsche. **(The "transition" buds of acid cherries.)**
Bad. Obst-u. Gartenb., 1958, **51**: 280, from abstr. in *InformDienst Weihenstephan*, 1958, No. 10, p. 168.

In the central region of sour cherry, peach and, more rarely, sweet cherry shoots the buds are often degenerate. Factors affecting the development of these "transition" buds are discussed.

1116. Yahiro, M., and Saeki, Y.
Studies on the reproductive growth of the mulberry. 1. On the period of floral formation and [the effects of] photoperiodism. [In English.]
Mem. Fac. Agric. Kagoshima Univ., 1956, **2**: 128-44, bib. 20.

Floral differentiation of the variety Murasakiwase (non-pruned group) occurred about the beginning of June. With the spring-pruned group the period of floral differentiation varied, but in general occurred between mid- and late June. Some varieties of the summer-pruned group produced flower buds about a month after pruning, while others did not produce them until 2 months or more after pruning. The number of flower buds produced by 2-year-old Roso trees was higher under short photoperiods than under natural and long photoperiods, but this difference was not apparent in 3-year-old trees. Flower bud numbers with the variety Okinawa showed no effect of photoperiodic treatment. Three-year-old seedlings produced male flowers only in short days, but in the following year female flowers were also produced. Seed vernalization at 5° C. for 30 days did not affect flower formation. In long-day conditions leaf number was lower, and shoot growth and internodes were longer, than under natural day length or short-day conditions. Growth of the variety Roso stopped during the second half of September, regardless of photoperiod, but with Okinawa growth stopped first under natural day length and last under short-day treatment. Short-day treatment for Okinawa reduced the number of lateral branches produced. Summer treatment with short days did not accelerate leaf-fall, but autumn treatment was more effective. Leaf-fall of Okinawa was delayed by long-day treatment.—Lab. Mulberry Cult., Kagoshima Univ.

Pollination.

(*See also* 1175c.)

1117. Nevkryta, A. N.
Distribution of apiaries for pollinating cherries. [Russian.]
Pchelovodstvo, 1957, **34** (4): 34-8, from abstr. in *Bee World*, 1958, **39**: 303-4.

There was an inverse relation between the visiting of cherry flowers by bees and the distance from the apiary. At 125 m. from the apiary the cherry crop was 6% less than round the apiary; at 250 m. it was 34% less, and at 3 km. 55% less. There was a sharp drop in visitation when the wind velocity reached 4·5 m./sec.; the most active visitation occurred at a wind velocity of 3 m./sec. and cloud cover 3/10ths. Bees did not visit the flowers at temperatures below 12° C.; the greatest activity was at 15–23° C.; above 23° C. it diminished. At 12–15° C. bees did not visit trees more than 125 m. from the apiary. At 4/10th cloud cover activity was diminished, and there was a sharp reduction in visitation at 7/10ths to 9/10ths cloud cover. Visitation by honeybees began at 8 a.m., and by other bees at 9 a.m. It is concluded that the apiary should be not more than 125 m. from the orchard, and that 4–5 colonies/hectare should be used when the weather is unfavourable.

1118. Bajpai, P. N., and Lal, A. B.
Storage experiments with pollens of cultivated fruit trees and vegetables.
Sci. and Cult., 1958, **23**: 616-17, bibl. 2.

Pollen of 14 species was stored for over 3 years at 30°, 32°, 36°, 40° F. and at room temperature, being kept in cellophane bags, in glass tubes with Ca Cl_2, and at 25% R.H. in desiccators. Figures are given for period of storage and maximum viability, and the best storage conditions are indicated. In general the lower range of temperatures with 25% R.H. were the most suitable.—Govt. agric. Coll., Kanpur.

1119. Vasil, I. K.
A criticism of Bajpai and Lal's paper entitled "Storage experiments with pollens of cultivated fruit trees and vegetables".
Sci. and Cult., 1958, **24**: 233, bibl. 8.

The results reported in the previous abstract are criticized on the grounds that acetocarmine is not a reliable staining agent with which to assess viability. The present author reports a storage experiment with *Solanum melongena* pollen in which viability was prolonged to 50 days when the pollen was stored at 39% R.H. and at 18°–20° C.—Univ. Delhi.

Soil management and nutrition.

(*See also* 1175d, 1233.)

1120. Braams, B. W., and Butijn, J.
Drainage in de fruitteelt. (**Drainage in fruitgrowing.**) [English summary ⅔ p.]
Meded. Dir. Tuinb., 1958, **21**: 763-70, bibl. 5, illus.

The authors propose certain principles on which the use of drainage in fruitgrowing may be based. Soil factors which must be considered are discussed. It is suggested that in orchards drainage should be adapted to the planting layout and that spacing of the tile drains should be a multiple of row width, viz. distances of 4–6 times those between the rows in very permeable soils, and of 2–3 times row width in the best soils.

1121. Aminov, H. L.
Fig irrigation in the Taškent province. [Russian.]
Soc. S.H. Uzbekistana, 1957, No. 4, p. 55, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,847.

From experiments with 2 fig varieties it is concluded that, on chernozems with a low water table, 4–5 irrigations at 800 cu.m./ha. are required during the growing season and 1–2 applications at 1,000–1,200 cu.m./ha. during the winter.

1122. Butijn, J., and Wiersema, G. P.
Wordt de fruitteelt een strokencultuur? (**Is fruit growing becoming a strip culture?**)
Fruitteelt, 1959, **49**: 6-9, illus.

The authors discuss methods and results so far in growing apples and pears in a cultivated strip, with a grass strip between the rows. The cultivated strip may be (straw) mulched, kept clean until July when a green manure is sown, or covered with plastic. Strip culture has not been fully tested on dry soils and is not therefore recommended for them.—Proefst. Fruit. Volle Grond, Wilhelminadorp, and Inst. TuinbTechn., Wageningen.

1123. Butijn, J.
De betekenis van bewortelingsopnamen in de fruitteelt. **(The importance of root excavations in fruitgrowing.)** [English summary $\frac{2}{3}$ p.]
Meded. Dir. Tuinb., 1958, **21**: 622-31, bibl. 24, illus.

The author discusses the effect of soil conditions and management on the distribution of feeder roots, and how knowledge of the properties of root systems can help in good fruit husbandry.

1124. Simons, R. K.
Organic carbon content in the soils of some Illinois apple and peach orchards as affected by varied cultural management systems.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 27-34, bibl. 11, illus.

A survey of 70 apple and peach orchards on 7 soil types showed that a proportion of the organic C content of the soil was quickly depleted by clean cultivation, but was retained under a grass cover. Significant increases in soil contents of organic C under an unmown grass cover were apparent after 4 years. This organic C reserve, however, could be destroyed by one season's cultivation. The practice in peach orchards of sowing a winter rye crop in September with cultivation during the summer was found to be detrimental to the supply and retention of organic C in the soil.—Univ. Ill., Urbana.

1125. Ljones, B.
Forsøk med jordkulturmåtar og nitrogengjødsling til frukttre 1951–1956. **(Studies on soil management and nitrogen manuring in orchards, 1951-56.)** [English summary $\frac{3}{4}$ p.]
Forskn. Landbruk., 1958, **9**: 453-71, bibl. 27.

Soil analyses showed that the amount of soil nitrate was greatly influenced by the method of orchard cultivation. In the grass plots, whether frequently or infrequently mown, substantially less nitrate was found than in clean cultivated soil. Several of the differences in tree growth and vigour can be explained by means of the nitrate figures. From experiments with young trees it is concluded that, in clean cultivated soil with a nitrate content of 8 mg. or more per 100 g. air-dried soil, no response is found to nitrogen applications. Where such soil was grassed down, the nitrate content was reduced to less than 1 mg. per 100 g. soil. This resulted in poorer growth of the trees. Applications of calcium nitrate counteracted the growth stagnation, but heavy dressings of up to 1,200 kg./ha. calcium nitrate were needed to obtain the same vigour as on clean-cultivated soil without nitrogen fertilization. Leaf samples from trees under grass had a larger content of ash, P, K, Ca and B, but less N and Mg as compared with leaf samples from trees in clean-cultivated soil. [From author's summary.] In two further experiments, carried out for 5 years on older apple trees under grass, different times and formulae of applying N were compared. Although the nitrate content of the soil was low, the effect of the fertilizers on growth, yields and fruit size was slight, but the N content of the leaves was raised above that of the controls.—Dep. Pom. Fruit Ind., agric. Coll. Norway.

1126. Kimura, M., and Sobajima, Y.
The influence of nitrogen on the growth of young fruit trees and the seasonal changes of the three elemental nutrients in the soil water. [Japanese, with English summary 20 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 69-73, bibl. 20.

In pot experiments with various fruit species such as Japanese persimmons and pears, figs, peaches and chestnuts shoot elongation was most vigorous from mid-May to the beginning of June, oil cake proving superior to ammonium sulphate as a source of N. In the drainage water N was found most abundantly in April and May as NO_3-N but as NH_4-N in July to September. P_2O_5 losses were most noticeable in June and July, and K more or less throughout the growing season, but particularly in May and June.

1127. Hosoi, T., Hirata, N., and Iwasaki, K.
Studies on the nutrition of Japanese pear trees. IV. The amounts of nutrient elements absorbed by Nijisseiki pear trees. [Japanese, with English summary 11 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 38-41.

The yearly amounts are given of N, P_2O_5, K_2O, CaO and MgO absorbed by 18-year-old pear trees planted 160 to the acre.

1128. Mori, H., and Yamazaki, T.
Studies on the nitrogen nutrition of apple trees in water culture. 2. The effects of restricted nitrogen supplies at various stages of growth on tree growth, fruit quality, and nutrient absorption of bearing apple trees. [Japanese, with English summary $\frac{1}{2}$ p.]
Bull. Tohoku nat. agric. Exp. Stat., 1958, No. 13, pp. 80-92, bibl. 3.

The effect of a two-month reduction in N supply from 100 p.p.m. to 10 p.p.m. at various times during the growing season was observed with 3 apple varieties. Leaf N content was reduced with low N supply, but no significant effect on growth was apparent. When N supply was reduced early in the growing season (May/June), fruit colour and quality were better than after later reductions. Physiological disorders were also fewer in trees with an early reduction in N supply. At the low rates of N, absorption of K, Mg and especially Ca was also reduced, but the annual total absorption of these elements was not affected by reduced N supply. [For Part I see *H.A.*, 28: 2196.]

1129. Suyama, T., and Mori, H.
Studies on leaf analysis of apple trees. 3. The relation of leaf N, P and K to fruit colour in apples. [Japanese, with English summary ½ p.]
Bull. Tohoku nat. agric. Exp. Stat., 1958, No. 13, pp. 73-9, bibl. 11.

Analysis of Ralls Janet trees showed that leaf contents of N, P and K decrease as the season advances; with P the decrease was rapid until July and then proceeded more slowly. When leaf N content was high in mid-June, fruit colour at harvest was generally poor. Leaf contents of P and K were not related to fruit colour. In N-deficient orchards leaf P content was higher, especially in August and September, than in normal orchards. It is suggested that leaf P may be a more sensitive indicator of N deficiency than leaf N. [For Part 2, see *H.A.*, 29: 122.]

1130. van Dam, J. G. C.
Resultaten van het N-P-K-proefveld op het Fruitteelt-proefbedrijf te Numansdorp. (**Results from the NPK experimental field at the Experimental Fruit Farm at Numansdorp.**)
Fruitteelt, 1958, **48**: 1162-4.

Young trees of Cox, Golden Delicious and Jonathan responded to N and K, but P had little or no visible effects on growth or fruiting. Responses to N and K application in yield, fruit size, deficiency symptoms and nutrient status of the soil are summarized.

1131. Pfaff, C., and Will, H.
Düngungsversuche mit Apfelbäumchen in Gefässen. (**Manurial trials with apple trees grown in containers.**)
Gartenbauwiss., 1958, **23**: 182-99, bibl. 9, illus.

In several years' manurial trials, in which apples (Freiherr v. Berlepsch on M.IX) were grown in a poor sandy soil, a complete fertilizer produced good yields. Repeated foliar application of urea, magnesium sulphate or trace elements also had a favourable effect. In the case of N, K or Mg deficiency the omission of these nutrients led to severe symptoms and yield losses in the second year. Reductions in yield due to P deficiency did not occur until the third year. In general, reduction in yield was due to reduction in weight of individual fruits. Only a sufficient supply of all nutrients guaranteed the formation of many large fruits, each deficiency shortening the growing period of the trees. The tolerance to low pH values was relatively large. Senescence caused by permanent N or K deficiency was quickly reversed on supplying the missing nutrient. Trees in pots "aged" comparatively quickly, their annual shoot growth soon decreasing in favour of rapidly increasing fruit formation. The highest nutrient contents were found in the leaves, the lowest—excepting K—in the fruits. With ordinary fertilizer applications the nutrients were absorbed in a ratio of N: P_2O_5: K_2O=1: 0·25: 1·5, the N: K ratio falling to 1: 2 with a higher K supply. High applications of P had no influence on the N: P ratio. Close relationships existed between the results of leaf analysis, yields and the total development of the trees. In the composition of the leaf an antagonism existed between Mg and K.—Landw. Versuchsstat. Limburgerhof.

1132. Fukuda, A., and Kondo, G.
Studies on the nutrition of peach trees. IV. Growth and yield as related to the concentrations of nitrogen, phosphoric acid and potassium in sand culture. [Japanese, with English summary 20 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 16-23.

Optimum concentrations in sand culture solution for growth and yield of 4-year-old Hakuho peaches proved to be N 40–80 p.p.m., P_2O_5 40–80 p.p.m. and K_2O 80–160 p.p.m. in the ratio N 10, P_2O_5 5–10, K_2O 10–20. The addition of excessive N in relation to K resulted in fruit drop. Increased P_2O_5 concentration promoted production of flower buds per unit shoot length.

1133. van der Meys, M. Q.
De invloed van bemesting op de groei en opbrengst van perziken. (**The effect of manuring on peach growth and yields.**)
A.R. Proefst. Groent. Fruit. Glas. Naaldwijk. 1957, pp. 59-61, illus.

Several levels of N, P and K were applied to peach trees growing in a cold house (in concrete tanks) and in the open. In both conditions there was little apparent effect of phosphate manuring. The optimum level of K_2O application was about 50 g. per tank (⅛ cu. m.) in the glasshouse. In the open soil K contents seemed adequate, but where necessary the application of 250 g. K_2O per 14 sq. m. can be recommended. The optimum level of N is probably about 250 g. per tree in the open.

1134. Binkley, A. M., Rogers, E., and Green, F. M.
Foliar analysis of Elberta peach leaves in relation to potassium fertilization.
Tech. Bull. Colo. Exp. Stat. **64**, 1958, pp. 16, bibl. 11.

Increasing K levels did not affect yield, new shoot growth or leaf analyses for N, P or K in Elberta peach trees. A rate of 60 lb. of P per acre per year for 4 years was adequate for peach growth, but N at 30 lb. per acre per year was too low. There was a tendency for trees at high K levels to drop their leaves sooner than no-K trees, but the difference was only significant in one year. There was an indication of a relationship between increased K rates and cold hardiness; numbers of dead buds tended to decrease with increased K levels. Nitrogen and K levels in peach leaves dropped considerably from July to September, and continued to drop after harvest. Reduction in the P content was less marked, and it increased again after harvest. No differences in fruit composition due to fertilizer treatment were observed.

1135. Akune, S., and Koga, K.
Studies on the relation between potassium content, respiration and catalase action in mulberry leaves. [Japanese, with English summary ¾ p.]
Bull. Fac. Agric. Kagoshima Univ., 1955, No. 4, pp. 143-55, bibl. 15, [received 1958].

Three levels of K were applied to mulberries and significant relations were found between leaf moisture content and leaf K (fresh weight), and between K supply and leaf K. Rates of respiration were higher at low K supply than at higher K levels, and at low K levels catalase activity was similar or slightly higher than at higher K levels. It is suggested that K deficiency is connected with dwarf (virus) disease of mulberry trees.

1136. Inoue, H., and Fukunaga, S.
Growth and fruiting of figs as related to the concentrations of nitrogen, phosphoric acid and potassium in sand culture. [Japanese, with English summary 14 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 50-4.

The concentration found to be best for growth of Masui Dauphine figs grown from cuttings was N 80 p.p.m., P_2O_5 40 p.p.m. and K_2O 40 p.p.m. while that for flower bud differentiation was N 160, P_2O_5 40 p.p.m. and K_2O 40 p.p.m.

1137. Bos, J.
Wat kali doet voor onze vruchtbomen. (**What potash does for our fruit trees.**)
[*Publ.*] *N.V. ned. Kali-import Mij*, 1958, pp. 36, bibl. in text, illus.

The rôle of potassium in the nutrition of top and soft fruits is fully discussed in 4 chapters on the effect of K manuring on the tree and the fruit, symptoms of potassium deficiency, potassic fertilizers in practice, and the theoretical background of potash manuring.

1138. van Alphen, T. G.
Bespuiting met koper op verschillende gewassen. (**Copper sprays for various crops.**) [English summary 2¼ pp.]
Literatuuroverzicht Centr. LandbDocument. **20**, 1957, pp. 65, bibl. 368.

The author reviews Dutch and foreign literature on the role of Cu in the plant, and the effect of Cu sprays on crops, including apples, pears and vines.

Pruning and training.

(*See also* 1175x.)

1139. Tukey, L. D.
New pruning methods promise saving in labor.
Science for the Farmer, 1958, **6** (2): 7, illus.

Apple trees were pruned to a "4-leaf clover" system, in which the tree was divided into quarters, and a swath maintained 3 feet wide into the centre of the tree between the quarters from all sides; all shoot growth developing in the swath area was removed annually, with the quarters left unpruned. Hand pruned trees required 11·4 min. per tree for the conventional form, and 5·1 min. per tree for the 4-leaf clover form. These times were 8·8 and 6·7 min., respectively, with power pruners. No differences in yields have resulted from the various treatments.

1140. van Stuivenberg, J. H. M.
Waarom wil de kop er niet dóór komen? (**Why will the head not grow on?)**
Fruitteelt, 1959, **49**: 12-13, illus.

When training Cox and Boskoop in a spindle form, budded maidens should not be cut back too hard, as this results in a division of the sap stream between side branches, instead of continuing the growth of the leader. Instructions are given on how to avoid and to cure this fault.—Proeft. Boom en Vrucht, Kesteren.

1141. van Stuivenberg, J. H. M.
Kan de produktie van Cox's Orange Pippin verbeterd worden? (**Can production of Cox's Orange Pippin be improved?)**
Fruitteelt, 1958, **48**: 1104-5, illus.

Fruiting in hedge-planted Cox trees was increased by bending down vigorous branches and thus obtaining a flat tree form. With this treatment the amount of June drop markedly decreased.—Proeft. Boom en Vrucht, Kesteren.

1142. Perraudin, G.
Influence du mode de conduite sur le rendement des arbres fruitiers basses-tiges. Quelques résultats d'essais en cours. (**The effect of method of training on yields of bush fruit trees. Some results of trials in progress.)**
Rev. romande Agric. Vitic., 1958, **14**: 89-91, illus.

Yields from dwarf pyramid trees were higher in the early bearing years than from bush trees. Initial yields from Black Jonathan on M.XVI were lower from bush forms than from unpruned trees. A similar effect was shown with Reinette du Canada on M.IV, with unpruned trees showing signs of premature ageing. Pear yields per unit area were higher from cordons than from dwarf pyramids at the start of bearing. Leaving pears unpruned was not found satisfactory.

1143. Scaramuzzi, F.
Alcune indagini sui fattori che possono regolare la vigoria iniziale dei germogli del pesco. (**Some investigations on factors which can regulate the initial vigour of peach shoots.)** [English summary ⅓ p.]
Riv. Ortoflorofruttic. ital., 1958, **42**: 378-89, bibl. 26, illus.

The later the winter pruning was carried out, the lower was the vigour of peach shoots in the following spring, in spite of the unchanged time of bud burst. The initial growth of the shoots was practically the same if, instead of pruning, all the buds were removed from those shoots which would have been cut away, or if they were ringbarked where they would have been severed. The apical buds on ringed shoots developed initially with almost the same vigour as those on shoots left in their natural state.

Spraying for cultural purposes.

1144. Westwood, M. N., and Batjer, L. P.
Factors influencing absorption of dinitro-ortho-cresol and naphthaleneacetic acid by apple leaves.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 35-44, bibl. 5, illus.

Absorption of DNOC (measured as percentage leaf necrosis 3 days after application) was greatly enhanced by prolonged rain at a relatively high temperature shortly after spray application. Trees grown at 50° F. before spraying absorbed less NAA than did those grown at 70° F. Absorption of NAA increased as the time needed to dry the sprays and the drying temperature increased. When Tween-20 was added to the spray NAA absorption was less dependent on external conditions. It is suggested that variability in the thinning effect of NAA might be reduced by adding a surfactant to the spray. The surfactants Tween-20, X-77 and X-114 all resulted in increased absorption when added to NAA sprays.—U.S. Dep. Agric., and St. Coll. Wash., Wenatchee.

1145. Thompson, A. H., Rogers, B. L., and Harley, C. P.
Some factors affecting chemical thinning of Golden Delicious apples with naphthaleneacetic acid plus Tween 20.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 45-51, bibl. 5.

On Golden Delicious trees which had previously been subjected to frost, 5 p.p.m. of NAA plus 1 pint of Tween-20 per 100 gal. resulted in no thinning when applied 5 and 10 days after full bloom, and in excellent thinning when applied 15, 20 and 25 days after full bloom. With rates of Tween-20 up to 1 pint there was no difference in the efficiency of thinning by 5 p.p.m. NAA. With 1 pint of Tween-20, 2·5 p.p.m. NAA resulted in insufficient thinning and 10 p.p.m. in overthinning. Orchard and greenhouse studies with C^{14}-labelled NAA indicated that application of the NAA-Tween mixture under conditions of high humidity does not result in increased absorption of NAA, or in greater thinning than when applied at moderate humidities.—Univ. Md, College Park, and U.S.D.A., Beltsville, Md.

1146. Harley, C. P., Moon, H. H., and Regeimbal, L. O.
Evidence that post-bloom apple-thinning sprays of naphthaleneacetic acid increase blossom-bud formation.
Proc. Amer. Soc. hort. Sci., 1958, **72**: 52-6, bibl. 3, illus.

In experiments with post-blossom thinning sprays of NAA it was observed that flower bud formation was increased by NAA sprays to a greater extent than could be accounted for by fruit removal. Branches of Golden Delicious were sprayed in an "off" year with NAA (plus Tween-20) 21 days after full bloom, and branches were partially defoliated at intervals between 8 and 15 days after spraying. Branches defoliated 8 or 9 days after spraying showed a much higher percentage of flower bud formation than unsprayed branches defoliated at the same time. The effect was reduced, but still apparent, in branches defoliated 11 and 15 days after spraying. Bud accumulations of C^{14} labelled NAA were observed.—U.S.D.A., Beltsville, Md.

1147. Glas, A.
Ervaringen met groeistoffen ter verbetering van de kleur van James Grieve. **(Experience with growth substances in improving the colour of James Grieve.)**
Fruitteelt, 1958, **48**: 1084.

Sprays of 7½ c.c. 2,4,5-T in 100 l. were applied to James Grieve apples (on IX) a few days before harvest. Fruit colour was much improved and phytotoxicity was slight.—Rijkstuinbouwconsulentschap, Amsterdam.

1148. Packer, W. J.
Hormones and apricots in Southern Victoria,
Vict. hort. Dig., 1958, **3** (3): 18-22, illus.
Fruit World, Melbourne, 1958, **59** (10); 29-32.

Concentrations of the triethanolamine salt of 2,4,5-T between 20 and 100 p.p.m. reduced preharvest drop, increased fruit size and accelerated maturity in all varieties tested. A 25 p.p.m. spray applied 10 days before or a week after stone hardening controlled fruit drop in Trevatt and Wandin Seedling trees. No permanent injury occurred to healthy trees, although there was some temporary scorching.

1149. Shigeta, T., and Yasunobu, Y.
Effect of 2,4,5-trichlorophenoxy propionic acid and 2,4,5-trichlorophenoxy acetic acid sprays on the ripening and size of peach and persimmon fruits. (No. 1.) [Japanese, with English summary ½ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1958, No. 6, pp. 31-6, bibl. 23, illus.

Spraying peaches with 2,4,5-TP and persimmons with 2,4,5-T reduced fruit drop and caused earlier ripening. There was some damage to the fruits and the young shoots, but the authors considered the treatments beneficial where the crop was heavy. J.R.L.

1150. Horticulture Division, D.S.I.R.
Effect of hormones on size and maturity of apricots, plums.
Orchard. N.Z., 1958, **31**: 319.

The application of 2,4,5-T to apricots at the start of stone hardening resulted in increases in fruit size, hastening of maturity (up to 10 days), and improvement in colour. A concentration of 50 p.p.m. was most generally satisfactory, and though some flagging and distortion of foliage occurred there was no permanent detrimental effect. Fruit drop of Roxburgh Red and Trevatt was reduced by hormone sprays. Trials with plums were abandoned, and variable results were obtained in trials with peaches.

1151. Schmadlack, J., and Zahn, F.-P.
Zur Frage der Entblätterung von Baumschulgehölzen mit chemischen Mitteln. **(The problem of chemical defoliation of nursery crops.)**
Dtsch. Gartenb., 1958, **5**: 257-9, bibl. 2, illus.

Application of 2 commercial hormone sprays gave unsatisfactory defoliation of young fruit trees. Sprays of 0·2–0·3% sodium chlorate are recommended for use in the nursery.—Inst. Gartenb., Dresden-Pillnitz.

Composition of trees and fruits.

(*See also* 1175i, 1176g, p.)

1152. Mochizuki, T., and Hanada, S.
The seasonal changes of the constituents of young apple trees. (Part I) Total sugars and starch.
Soil and Plant Food, 1957, **2**: 115-22, bibl. 20.

Observations were made on changes in total sugars and starch content in 3-year-old Ralls Janet apple trees as shown by samples taken on 28 April, 28 May, 28 June, 2 August, 10 October and 28 November. No new facts were elicited with regard to sugar content. Starch deposition was found to decrease on 28 May at the beginning of shoot growth and to increase slightly late in June when there was a slight retardation in rate of shoot growth. Starch decreased again in early August at the time of most active growth but began to increase again at the end of shoot growth, to reach its maximum at leaf fall. The above cycle was much more noticeable in roots than in shoots and leaves. The authors explain the phenomena as follows:—Reserve starch in the roots is partially removed to the wood tissues of the aerial parts of the tree before the buds begin to swell. The wood tissues appear to play a direct part in feeding starch to the bark. Hence, at the time when top growth is mainly dependent on the previous season's reserve starch, the starch content in the wood is higher than that in the bark, and at the time of active growth in August the content both in wood and bark falls greatly. In autumn when the accumulation of starch begins, it deposits first in the bark and then gradually moves to the wood tissues, so that at leaf fall the content becomes about the same in both tissues. There would appear to be a sort of transitional period in the starch cycle during May and June when the previous year's starch reserve is at its lowest. This is noticeable first in the younger branches and it gradually advances to the older ones.

1153. Mazliak, P.
Development of the lipin layer in the skin of White Calville apples during ripening. [French.]
C.R. Acad. Sci., Paris, 1958, **246**: 3368-70, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-42.

The apples were stored 4–5 months at 4°; the lipins in the peel (after removal of pectins) were extracted with light petroleum and separated into oil and wax fractions by the Huelin-Gallop procedure. Concentration of lipins (per unit area of peel) increases from harvest to a maximum at maturity, the wax % remaining approx. constant but the oil % increasing continuously to approx. 5-fold. During senescence lipin concentration decreases, the oil % falling rapidly. Paper chromatographic analyses show that ursolic (C_{30}) and oleic acids are present in the wax during ripening; five acids (including oleic and probably palmitic and linoleic) are present in the oil at the time of harvesting, but three others appear during ripening.

1154. Siegelman, H. W., and Hendricks, S. B.
Photocontrol of alcohol, aldehyde and anthocyanin production in apple skin.
Plant Physiol., 1958, **33**: 409-13, bibl. 12.

The time courses of aldehyde, alcohol, and anthocyanin syntheses in light and darkness were measured in apple skin floating on sucrose solutions. Radiation suppresses aldehyde and alcohol syntheses with a sparing of sugar in a manner equivalent to the suppression of fermentation by oxygen and sugar use in fermentative systems. The time course of anthocyanin synthesis indicates that 2 radiation-limited steps are involved in anthocyanin synthesis in apple tissue. [Authors' summary. See also *H.A.*, 29: 144.]—Agric. Res. Serv., U.S.D.A., Beltsville.

1155. Friedrich, H.
Untersuchungen über die phenolischen Inhaltsstoffe von *Pyrus communis*. III. Der Einfluss von Pfropfungen auf den Arbutingehalt der Blätter von Reiss und Unterlage.

(Investigations on the phenolic constituents of *Pyrus communis*. III. The influence of grafting on the arbutin content of leaves of scion and stock.
Pharmazie, 1958, **13**: 54-7, from *Biol. Abstr., Sect. D*, 1958, **32**: Abstr. 42,040.

The leaves of pear scions contained more arbutin when *P. betulaefolia* and *P. amygdaliformis* were used as stocks than when *P. communis* served as such. Leaves of the first two species in an ungrafted condition contained more arbutin than those of the various scions. In ungrafted seedlings, the arbutin content of the leaves increased from those high on the tree to those lower down. Apple leaves contained no arbutin. When apple was grafted with pear during the summer, the new pear leaves of the following spring always contained arbutin, whether pear served either as stock or scion, whereas the apple leaves were always completely free of arbutin. Similarly the leaves of pears worked on arbutin-free quince stocks also contained arbutin. The results suggest that while arbutin itself does not migrate from stock to scion an arbutin precursor does move from one to the other.—Inst. KulturpflForsch, Gatersleben.

1156. Walker, D. R., and Hendershott, C. H.
Substance in peach buds inhibits growth.
Res. and Fmg N.C., 1958, **17** (2): 7.

A growth inhibitor has been isolated and purified from dormant Elberta peach buds. The concentration present did not change between August and January, but subsequently it decreased.

1157. Andrews, P., and Hough, L.
The biosynthesis of polysaccharides, Part I. The composition of plum-leaf polysaccharides. Part II. Incorporation of $^{14}CO_2$ into plum-leaf polysaccharides during photosynthesis.
J. chem. Soc. Lond., 1958, pp. 4476-83, bibl. 16, and 4483-8, bibl. 15.

Hydrolysis of the polysaccharides from Victoria plum leaf afforded mainly D-galactose, D-glucose, L-arabinose, D-xylose, and D-galacturonic acid. Smaller amounts of D-mannose, L-rhamnose, L-fucose, 2-*O*-methyl-D-xylose, 2-*O*-methyl-L-fucose, and glucuronic acid were also isolated. Some fractionation of the leaf polysaccharides was achieved by successive extractions with water and aqueous alkalis. The cellulose content has been investigated.

The rate of incorporation of $^{14}CO_2$ into plum leaves during 48 hours' photosynthesis and the distribution of the ^{14}C between the methanol-soluble and -insoluble portions of the leaves were determined. At the end of this period the polysaccharides in the insoluble portion were fractionated and the specific activities of their main monosaccharide constituents estimated. ^{14}C-labelled D-glucose, D-galactose, L-rhamnose, L-arabinose, D-xylose, and D-galacturonic acid were obtained crystalline or as crystalline derivatives. The extent of ^{14}C incorporation into these monosaccharides varied widely from one to another, and the specific activities of each monosaccharide, except D-galactose, differed significantly in different polysaccharide fractions. [Authors' abstracts. See also *H.A.*, 27: 179 and 180 and 28: 180a and 180b.]—Univ. Bristol.

Harvesting.

(*See also* 1175a, q, s, t, 1176k.)

1158. McMechan, A. D., and Fisher, D. V.
The bulk bin method of handling fruit. I. Cooling and bruising of McIntosh apples.
Canad. J. Plant Sci., 1958, **38**: 440-4, bibl. 3, illus.

Fruit in bins with no facilities for ventilation cooled more slowly than those in bushel boxes, but in bins with an opening 1 in. deep at floor level fruit cooled almost as quickly as in bushel boxes. Fruit in good condition when dumped from containers soon after picking was less bruised when handled in bins than in boxes, but there were no differences in the extent of stem puncturing. Holding the apples for 7 days in non-refrigerated storage before dumping from the containers resulted in an increase in stem punctures in bin-handled fruit. After cold storage for 36 hours before dumping, there were no differences in bruising or stem puncturing between handling in bins and bushel boxes.—Canada Dep. Agric., Summerland, B.C.

1159. McMechan, A. D., and Marshall, J.
We find bulk harvesting pays off.
Grower, 1958, **50**: 1216-17, illus.

Standard bins in use in British Columbia measure 48in. × 43in. × 29in. including integral pallet, i.e. 24 in. deep inside. Made of exterior grade plywood they weigh 85 lb. empty and about 900 lb. when filled with 25 loose bu. of apples. They are handled using tractors equipped with fork lifts. Dumping by having the bins fitted with end-gates or by complete inversion by special equipment has been satisfactory, but dumping by a device which turns the bin through 105° and permits the fruit to leave from the partially covered top has caused, in some cases, an increase in stem punctures with stored McIntosh apples. Experimental handling of Vee peaches indicated that they may be picked into bins to a depth of 10 in. and removed through an end gate without any more damage than by conventional harvesting methods. Bins may also be used for fruit storage and their use can increase the available capacity up to 40%. [See also previous abstract.]—Canada Dep. Agric., Summerland, B.C.

1160. Dahling, R.
Controlling prune quality.
West. Fruit Gr, 1958, **12** (9): 13-14, illus.

Prunes for dehydration may be harvested 7–10 days earlier than those for sun-drying. Indication of time to harvest is given by sugar and pressure tests. In a study of pruning methods ladder pruning (many small cuts) was better than saw pruning (few large cuts). With ladder-pruning trees produced larger fruit, had better distribution of fruiting and new wood, and the tendency to alternate bearing could be reduced.

1161. Ginsburg, L.
Factors that influence the keeping quality of South African peaches on the different markets.
Dec. Fruit Gr, 1958, **8**: 279-84, bibl. 3, illus.

Using a penetrometer in which a $\frac{7}{16}$-in. diameter plunger is driven in to a depth of $\frac{5}{16}$ in., it was found that peaches picked at pressures between 25 and 30 lb. will ripen to juicy fruits, provided that cold storage does not exceed 14 days. The quality of such fruits is often poor. Peaches picked at an immature stage become "woolly" if stored for longer than 14 days. It is suggested that peaches for oversea markets should be picked at pressures below 25 lb.—W. P. Fruit Res. Stat., Stellenbosch.

Packing and storing.

(*See also* 1078h, 1175f, h, v, y, z, 1176e, h, o, 1268, 1321.)

1162. Burt, S. W.
Mechanized packing of McIntosh apples.
Agric. Mktg, 1958, **3** (9): 14, illus.

Labour needs are much reduced by the use of an experimental mechanical packing line consisting of an automatic dumper, an adjustable sorting table, a dimension sizer, an automatic box filler, a return flow belt for accumulated fruit and a mechanical tray packer. To ensure freedom from bruising only firm fruit with a resistance above 10 lb., as measured by pressure test, should be used.

1163. Perkins, F. A.
Reducing injuries to poly-packed Maine McIntosh apples.
Me Fm Res., 1958, **6** (3): 12-13, illus.

McIntosh apples were jumble-packed in polythene bags of 2 shapes, each holding 3 lb. placed in cardboard cartons for shipment to market. Nearly 20% of the apples in long bags packed vertically in a single tier were severely bruised on arrival. Bruising of apples in the same-shaped bag, but packed horizontally, was about 9%. A similar rate of bruising occurred in apples in 2 layers of squat bags packed vertically.

1164. Anon.
New packing material tried on apples.
Grower, 1959, **51**: 164-5, illus.

Sleeves of Carbion (a flexible packaging material) were put round alternate apples in non-returnable boxes, with a sheet of Carbion between each layer of fruit. Promising results have been obtained both in protecting the fruit from injury and in reducing the time of packing.

1165. Ewald, K.
Beiträge zur Feststellung der Wirkung der Luftwäsche im Apfelkühllager. (**On the effect of air scrubbing in the cold storage of apples.**)
Gartenbauwiss., 1958, **23**: 215-53, bibl. 43, illus.

(1) *Effects on the storage atmosphere:* Scrubbing increased the relative humidity of the chamber to a very high level (over 95%) which was associated with the incidence of moulds on the walls. The physical purification of the atmosphere caused an enlargement of the dust particles, but the number of nuclei of condensation was not reduced. The concentration of fungus spores in the scrubbing chamber amounted to several times that of the control chamber. The chemical purification did not include ethylene, but the volatile aroma substances were effectively removed. The movement of air in the chamber was increased by the air circulation necessary for scrubbing. (2) *Effects on the stored apples:* Acid, sugar, dry matter and vitamin C content, colour and flavour of the juice, physiological injuries and losses, post-storage losses and respiration were hardly affected by scrubbing. The latter has, however, a beneficial effect on the firmness of the pulp and on weight loss. Scald occurred too rarely for any comments to be made, but scald incidence on bruises was clearly reduced. The most noticeable difference between scrubbed apples and controls was in relation to shrinkage, the former retaining their well-rounded and turgid appearance to the end of the storage period. The difference was more pronounced in Cox's Orange than in Goldparmäne. With both varieties losses from rots, especially *Gloeosporium*, were greater in the scrubbed chambers owing to the higher humidity. [Translation of authors' summary.]—Tech. Hochsch., Hannover.

1166. Behmer, M.
Untersuchungen über den Austausch von Kohlendioxyd und Äthylen bei lagernden Äpfeln. (**Studies on the exchange of carbon dioxide and ethylene in stored apples.**)
[English, French and Spanish summaries 8 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 257-73, bibl. 58.

The gas exchange of certain apple varieties in gas storage was recorded, partly with the aid of ethylene containing C^{14}. It was found that the CO_2 and ethylene production increased rapidly until the storage atmosphere had reached about 4·8 vol. % of each gas. Production then decreased and afterwards remained at a constant level. The influence of storage temperature on these processes is discussed. The addition of ethylene to the atmosphere accelerated ripening and increased both the production of CO_2 and the consumption of O_2. The evidence suggests that the ripening action of ethylene is not based on the absorption of the gas by the fruit, but on an increase in permeability which stimulates the O_2 intake and thus accelerates metabolism.

1167. Neal, G. E., and Hulme, A. C.
The effect of 2:4-dinitrophenol on the respiration of apple tissue in relation to the respiration climacteric.
J. exp. Bot., 1958, **9**: 403-7, bibl. 6.

The respiration of pre-climacteric apple pulp but not peel tissue can be stimulated by addition of DNP. Post-climacteric pulp and peel tissue cannot be stimulated by DNP. The disappearance of DNP stimulation of pulp tissue respiration, and also the development of a malate-decarboxylating system in the peel, are closely associated with the respiration climacteric in the whole fruit. [Authors' summary.] —D.S.I.R., Ditton Lab.

1168. Richardson, H. H., and Roth, H.
Observations on methyl bromide fumigation of fruit under plastic tarpaulins and at cold temperatures.
J. econ. Ent., 1958, **51**: 436-8, bibl. 3, illus.

Fumigation with 3 to 3½ lb. of methyl bromide per 1,000 cu. ft. at 40 to 45° F. did not affect the condition or flavour of plums, peaches or apricots. *Eulia* sp. and *Eriopsis connexa*, lightly infesting the fruit, were killed within 24 hrs. In additional trials plums showed tolerance to 5 lb./ 1,000 cu. ft. of methyl bromide.—Agric. Res. Serv., U.S.D.A.

1169. Katzfuss, M.
Untersuchungen über den Vitamin-C-Gehalt des Ontarioapfels während der Lagerung. **(Studies on the vitamin C content of Ontario apples during storage.)**
Dtsch. Gartenb., 1958, **5**: 319-20, bibl. 8.

Ontario apples from trees on M.IX ripened earlier during storage than those from trees on M.XI. Average fruit contents of ascorbic acid and vitamin C were lower from trees on M.IX than on M.XI. During storage, contents of ascorbic acid and vitamin C were constant in fruits from M.IX trees, but in fruits kept for 1 or 2 weeks at room temperature there were marked changes in contents. Before maturity both vitamin C and ascorbic acid contents increased during room-temperature storage, but after maturity contents of both decreased. Ascorbic acid and vitamin C contents from fruit on M.XI showed a slight decrease at room temperature.—Inst. Obst-u. Gemüseb., Martin-Luther-Univ., Halle.

1170. Lee, W. A., and Wennergren, E. B.
Bruising continuous in apple processing.
Science for the Farmer, 1958, **6** (2): 6, illus.

Bruising of processing apples at the grower stage was greater in larger and more mature apples than in less mature fruit. Stayman fruits showed the most and Golden Delicious the least bruising of the varieties studied. The method of picking had more effect on bruising than the type of bag used. Bruising was substantially increased by grading before cold storage. The weight of bruised apple flesh decreased after 30 days in cold storage, but the number of bruises did not change, and bruises which were not removed by trimming increased from 23 to 35% after 30 days in cold storage.

1171. Metlickij, L. V., and Cehomskaja, V. M.
The biochemistry of physiological diseases of apples, [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **122**: 863-6, bibl. 12.

During a study on the course of ripening and storage in 2 scald-resistant and 2 scald-susceptible apple varieties the respiratory quotient of different tissues, alcohol and aldehyde content, peel porosity, resistance to anaerobiosis, tannin metabolism connected with enzymic browning and redox activity were compared in healthy and affected fruits.

1172. Perraudin, G., and Favre, C.
Essais de prématuration de fruits exécutés en 1957. **(Experiments on artificial ripening of fruits in 1957.)**
Landw. Jb. Schweiz., 1958, **7**: 545-50.

Preliminary data are given on the treatment of two tomato, one apricot and two apple varieties with a patent gas mixture [details not given] in a chamber specially designed to regulate temperature and atmosphere.

1173. Claypool, L. L., and others.
Influence of ripening temperature, ripeness level and growing area on quality of canned Bartlett pears.
Food Technol., 1958, **12**: 375-80, bibl. 20, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-42.

Pears from 3 major producing areas in California were ripened at 68°, 77° and 86° F. Acidity increased during the later stages, and the content of volatile reducing substances in the canned product increased as the firmness of the fruit decreased. Ripening at 86° F. resulted in a slightly higher soluble solids content and a lower content of volatile reducing substances than at the other temperatures. Ripening at 86° F. to a firmness of about 2 lb./sq. in. pressure test ($\frac{5}{16}$-in.

plunger) gave a canned product with a more natural flavour. Growing area had less influence than the other factors on flavour.

1174. Padfield, C. S.
Cold storage of Hawke's Bay plums.
Orchard. N.Z., 1958, **31**: 347-9.

The response of 6 varieties to storage at 32° F. is tabulated. Varieties differed in behaviour, but Mariposa stored well. Earlier work showed that Omega will store well for a limited period.—D.S.I.R., Havelock North.

Noted.

1175.

a. Anon.
Bulk handling saves cost and labour.
Fruit World Annual, 1958, pp. 51-7, illus.
Details and organization of an effective apple harvesting system.

b Baldini, E.
Contributo allo studio delle cultivar di susino. Indagine pomologica comparativa sulle cultivar introdotte a Firenze presso il Centro Miglioramento Piante da Frutto e da Orto del C.N.R. (**Contribution to the study of plum varieties. Comparative pomological investigation of varieties introduced into Florence at the fruit- and vegetable-breeding centre of the C.N.R.**)
Riv. Ortoflorofruttic. ital., 1958, **42**: 200-33, bibl. 13, illus.; 290-319, illus.; 390-423, illus.
Full descriptions, arranged in alphabetical order of varieties.

c Barg, T.
Cytologische Untersuchungen an Sauerkirschen. (**Cytological studies of acid cherries.**)
Gartenbauwiss., 1958, **23**: 200-8, bibl. 13.
Studies and a discussion of semi-sterility in acid cherries.

d Baxter, P.
Urea in apple and pear orchards.
J. Agric. Vict., 1958, **56**: 721-6, bibl. 11, illus.
Uptake and action as foliar spray and as soil dressing discussed.

e Bezručenko, N. Z.
Heterophylly in *Pyrus communis*. [Russian.]
Bot. Žurnal, 1958, **43**: 1485-8, bibl. 2, illus.
Occurrence and distribution of palmate leaves on seedlings.

f Breakiron, P. L.
New loading method cuts shipping costs for peaches.
Agric. Mktg, 1958, **3** (9): 15, illus.
In tapered baskets, alternately inverted and stacked offset like bricks.

g Bulgakov, M. V.
Ten years' work on fruit growing in the north of the Sverdlovsk province. [Russian.]
Agrobiologija, 1958, No. 5, pp. 109-19.
Nursery and orchard work and varieties of apple, pear, plum and cherry in a very severe climate.

h Burger, I. J.
Sulphur houses.
Dec. Fruit Gr, 1958, **8**: 217-19, illus.
Types (including costs), details of construction, and sulphur burning.

i Gee, M., Reeve, R. M., and McCready, R. M.
Reaction of hydroxylamine with pectinic acids. Chemical studies and histochemical estimation of the degree of esterification of pectic substances in fruit.
J. agric. Food Chem., 1959, **7**: 34-8, bibl. 17.
With tables showing percentage of esterification of pectic substances in peaches, apples and pears of varying ripeness.

j Gerritsen, C. J.
De vijg. (**The fig.**) [English summary 12 lines.]
Meded. Dir. Tuinb., 1958, **21**: 849-53, bibl. 8, illus.
The possibilities of fig cultivation in the Netherlands are discussed.

k Gollmick, F.
Beobachtungen an *Malus*-Artbastarden I. (**Observations on *Malus* hybrids I.**) [Russian and English summaries ⅓ p. each.]
Arch. Gartenb., 1958, **6**: 359-82, bibl. 19, illus.
Morphological studies on venation, leaf form, and pistil number.

l Hanson, K. W., and others.
Sources of propagating wood for peaches and nectarines in the United States and Canada.
Fruit Var. hort. Dig., 1958, **13**: 6-16.
Extensive lists of Stations and varieties.

m Havis, A. L.
Mix-up of Loring and Redskin peach varieties.
Fruit Var. hort. Dig., 1958, **13**: 2.
Two promising new yellow freestone peaches may be confused, but Loring ripens about 12 days before Redskin.

n Herlihy, T. F.
Grafting fruit trees.
J. Agric. W. Aust., 1958, **7**: 381-94, illus.
Tools, methods of grafting and frameworking, and a compatibility chart for pome and stone fruits.

o HILKENBÄUMER, F.
Elektronenmikroskopische Untersuchungen über den Aufbau kräftig entwickelter Cuticulae von Apfelfrüchten. (**Electron-microscopic studies on the structure of well-developed cuticles of apple fruits.**)
Reprinted from *Z. Naturf.*, 1958, **13b**: 666-8, bibl. 9, illus.
The morphology of the outer epidermis of Ontario and Brettacher Sämling fruits.

p HONAN, N. D.
The South African apple industry.
Quart. Rev. agric. Econ., Canberra, 1958, **11**: 139-44, bibl. 7.
Present status and possible future trends.

q HULSEBOS, D.
Een goede pluksleе. (**A good picking platform.**)
Fruitteelt, 1958, **48**: 978, illus.
Two-tiered.

r JACKSON, T. H., BENNISON, R. H., AND EVANS, H. R.
Notes on Kenya agriculture. IV.—Fruits and vegetables.
E. Afr. agric. J., 1958, **24**: 79-91.
Suitable varieties and short cultural notes on tropical and temperate fruit crops and temperate vegetables.

s KRIJGSMAN, H. K., AND DE RUITER, J.
De plukemmer. (**The picking basket.**)
Fruitteelt, 1958, **48**: 932-3, illus.
A new picking basket suspended from the shoulders in front of the picker so that both hands are free.

t KRIJGSMAN, H. K., AND DE RUITER, J.
De werkstelling. (**The working platform.**)
Fruitteelt, 1958, **48**: 954-5, illus.
Advantages discussed [see *H.A.*, 28: 160].

u LJONES, B.
Kirsebaersortar. Kort omtale av sortar som er dyrka eller prøvedyrka i Norge. (**Cherry varieties. A short report on varieties grown or under trial in Norway.**)
[*Mimeo.*] *Inst. fruktdyrk. fruktkons. Norges LandbHøgsk.* **4,** 1958, pp. 31.
Brief notes on origin and introduction into Norway, with some cultural details.

v LOEWEL, E. L.
Die Eignung einiger Pflaumen, Zwetschen und Renekloden für die Herstellung einer "ungekochten Konfitüre". (**The value of some plums, damsons and gages for the production of uncooked candied fruit.**)
Mitt. ObstVersuchsringes Jork, 1958, **13**: 295-6.
Varietal recommendations.

w LOTOVA, L. I.
A study on the comparative anatomy of the wood of standard and dwarf apple trees. [Russian.]
Bot. Žurnal, 1958, **43**: 1728-34, bibl. 8, illus.

x LÜTHI, E.
Die Dreileitastkrone ein Fortschritt beim Oeschbergschnitt. (**The three-limbed top, an advance in the Oeschberg method of pruning fruit trees.**)
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 645-7, illus.
Three limbs, evenly distributed around the leader, are better than four.

y MARCELLIN, P.
Quelques perfectionnments susceptibles d'être apportés à l'emploi de la réfrigération des fruits. (**Some promising improvements in fruit refrigeration practice.**)
Fruits et Prim., 1958, **28**: 108-10, bibl. 4.
Controlled atmosphere storage, plastic packings, wax and other coatings.

z MAUCH, A.
Kistenstapeln und Transport in begrenzten Räumen. (**Stacking boxes and transport in small buildings.**)
Mitt. ObstVersuchsringes Jork, 1958, **13**: 298-300, bibl. 1, illus.
A method used in a commercial fruit store is briefly described.

1176.

a MICHARD, P.
Une immense ressource agricole de la France: le pommier à cidre. (**An important agricultural potential in France: the cider apple tree.**)
Rev. hort. Paris, 1958, **130**: 1940-5, illus.
Detailed instructions on top-working with a view to increasing the production of eating apples.

b MILELLA, A.
Le cultivar di fico allevate in Sardegna. (**Fig varieties grown in Sardinia.**) [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1958, **42**: 325-43, bibl. 9, illus.
Ten varieties illustrated and described.

c MORETTINI, A.
Le varietà di pesco per i frutti sciroppati. (**Varieties of peach for preserving in syrup.**)
Ital. agric., 1958, **95**: 831-9, bibl. 10, illus.
Particulars of 18 varieties.

d MOUAT, H. M., AND MCKENZIE, D. W.
Apple rootstocks in New Zealand orchards.
Orchard. N.Z., 1958, **31**: 294-7, bibl. 7.
MM.793 added to the standard recommendations.

e Mukerjee, P. K.
Storage of pomegranate (*Punica granatum* L.).
Sci. and Cult., 1958, **24**: 94
Fruit was successfully stored for 7 months at 32° and 40° F. and at 80 to 85% R.H.

f Murawski, H.
Beiträge zur Züchtungsforschung beim Apfel. III. Phänologische, morphologische und genetische Studien an F'_2-Sämlingen einer Kreuzung zwischen *Malus zumi* mit Kultursorten. (**Breeding investigations with apple. III. Phenological, morphological and genetical studies with F'_2 seedlings from a cross between *Malus zumi* and apple varieties.**)
Züchter, 1958, **28**: 297-309, bibl. 16, illus.
Twenty-five characters analysed genetically. [For Part II see *H.A.*, 24: 1156.]

g Nordnes, T., and Offergaard, E.
Naeringsinnholdet i frukt, baer og grønnsaker. (**The nutritional value of top fruit, small fruit and vegetables.**)
Forskn. Landbruk., 1958, **9**: 527-40.
Water, ash, protein, fat, carbohydrate, fibre, iron and vitamin C contents of 14 top and small fruits and 29 vegetables.

h Padfield, C. S.
1958 investigations: cold storage of Hawke's Bay peaches.
Orchard. N.Z., 1958, **31**: 299.
Storage of Golden Queen at 32° F. for 2 months was not successful.

i Plock, H.
Frosthärtere Kirschenunterlagen und Stammbildner. (**Cherry rootstocks and stem builders more resistant to frost.**)
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 274-6, illus.
On the selection of *Prunus avium* mother trees for seed production.

j Quebec.
Annual Report of the Pomological and Fruit Growing Society of the Province of Quebec, 1957, pp. 76.
General articles are included on marketing apples, the apple orchard of the future, and a survey of apple growing in western Europe.

k Rowbotham, J. C.
Further developments in the bulk-harvesting of apples.
J. Agric. W. Aust., 1958, **7**: 477-81, illus.
Various types of bin and methods of bulk handling apples and pears described.

l Schuricht, R.
Die betriebswirtschaftliche Problematik der Eingliederung des Obstbaues in den landwirtschaftlichen Betrieb. (**Economic problems of the organization of fruit-growing within an agricultural holding.**) [English and Russian summaries ½ p. each.]
Arch. Gartenb., 1958, **6**: 345-58, bibl. 9.
The availability of sufficient labour and manure, and the economic size of the fruit holding.

m Shear, S. W., and Blair, R. E.
California fruit statistics and related data.
Bull. Calif. agric. Exp. Stat. **763,** 1958, pp. 269.
Acreages, yields, utilization, grower returns, etc., mostly up to 1955.

n Stannek, G.
Die Arbeitskräfteplanung bei der Kernobsternte. (**Planning the labour force for harvesting pome fruits.**)
Dtsch. Gartenb., 1958, **5**: 290-2, bibl. 2.
Labour requirements per 100 trees or per 100 kg. fruit.

o Stoll, K.
Versuche zur Verhütung der Hautbräune an Äpfeln. (**Experiments on the prevention of scald in apples.**)
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 621-5, bibl. 2, illus.
Several years' inconclusive storage tests.

p Swain, T., and Hillis, W. E.
The phenolic constituents of *Prunus domestica*. I. The quantitative analysis of phenolic constituents.
J. Sci. Food Agric., 1959, **10**: 63-8, bibl. 27.
Methods for anthocyanins, *leuco*-anthocyanins, flavanols and total phenols.

q Thomas, F. B., and Ritter, C. M.
Varietal influences on quality of apple sauce blends.
Prog. Rep. Pa agric. Exp. Stat. **193,** 1958, pp. 4, bibl. 3.
Preference for sauces with relatively high solids and high acid contents.

r Tomcsányi, P.
Módszertani megfontolások a gyümölcsfatörzskönyvezés szabványosításával kapcsolatban. (**Methodological considerations concerning the standardization of fruit tree certification.**) [German summary ½ p.]
Reprinted from *Szabványügyi Közlemények*, 1958, No. 6, pp. 1-4.
In Hungary.

s Watson, W. W.
Peach varieties studied in Delta.
Miss. Fm Res., 1958, **21** (4): 8, illus.
List of 27 varieties showing flesh colour and ripening dates.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 1016, 1077o, 1176g, 1231b, i-l, n, o, q, r, u, 1390.)

1177. SCHANDERL, H.
Befruchtungsverhältnisse bei schwarzen Johannisbeeren. (**Pollination in black currants.**)
Flüssiges Obst, 1958, **25** (9): 46, from abstr. in *InformDienst Weihenstephan*, 1958, No. 8/9, p. 150.

In one year's experiments with the black currant varieties Silvergieters and Rosenthal's Langtraubige the latter yielded more if pollinated by another variety. However, the presence of bees at flowering time was of more importance to yield than the source of pollen.

1178. INDENKO, I. P.
Phosphorus uptake with foliar nutrition of blackcurrants. [Russian.]
Bjul. n.-tech. Inf. nauč. Mičurin isl. In-t. Sadov, 1957, No. 3, pp. 9-12, from abstr. in *Beerenobstschrift.*, 1958, No. 13, p. 11.

In young leaves uptake of P^{32} by the upper surface was equal to that by the lower surface; but it became less than that of the lower surface with increasing age.

1179. LEE, W. R.
Pollination studies on low-bush blueberries.
J. econ. Ent., 1958, **51**: 544-5, bibl. 3.

It was found that insect pollinators are essential for satisfactory fruit set in low-bush blueberries (*Vaccinium lamarckii*) and that bees are capable of pollinating this species. A high percentage of blueberry flowers normally set fruit but considerable variation was observed as between clones.—Univ. N.H., Durham.

1180. DE HAAS, P. G., EWALD, K., AND BÜNEMANN, O.
Lagerungsversuche an Kulturheidelbeeren. (**Storage trials with cultivated blueberries.**)
Gartenbauwiss., 1958, **23**: 209-14, bibl. 4.

In 3 years' trials −2° to +4° C. proved to be the optimum temperature for the storage of blueberries, the duration of which should not exceed 10 days. Ozone treatment had little influence on keeping quality but it improved the flavour initially. At all temperatures sugar content increased with storage, but the acid content showed little change.

1181. RITTER, C. M.
Responses of cultivated elderberry varieties to fertilizer and mulch treatments.
Prog. Rep. Pa agric. Exp. Stat. **195**, 1958, pp. 3, bibl. 2, illus.

Two elderberry varieties, Adams No. 1 and Adams No. 2, were planted in 1956, so that commercial cultural practices might be developed. Yields from Adams No. 2 were significantly higher than from Adams No. 1. The response of both varieties to sawdust mulch was limited; in 7 of 10 comparisons mulched plants outyielded non-mulched, but the differences were not significant. No response to fertilizer treatments was apparent. Plant size suggests that spacing at 5×15 ft. would be better than at 10×15 ft. Suggested pruning treatment, based on growth observations, is to remove all growth except 5 or 6 strong one- and two-year-old shoots.

1182. DELBARD, G., AND TRIOREAU, M.
Les petits fruits. Le framboisier. (**Small fruits. The raspberry.**)
Arboric. fruit., 1958, No. 56, pp. 5-10, No. 58, pp. 10-15.

In the second part the results of 5 years' observations in France on the behaviour of 17 varieties of raspberry—mostly British—are given in tabular form. Eight varieties have been retained, viz. Malling Landmark, Norfolk Giant, Lloyd George, Haytor, M. Promise, M. Exploit, M. Jewel and M. Enterprise.

1183. SÁGI, F.
Néhány bogyósgyümölcsű terméseiben előforduló szerves savak, cukrok és színanyagok papírkromatográfiás vizsgálata. (**Paper chromatographic studies on organic acids, sugars and pigments in some small fruits.**) [English and Russian summaries ½ p.]
Növénytermelés, 1958, **7**: 53-62, bibl. 4, illus.

The organic acid, sugar and pigment contents of fruits of *Ribes* and *Rubus* species, varieties and hybrids were determined by paper chromatography. Differences in contents were detected, and this method, supplementing other forms of evaluation, may become a valuable aid in breeding.

1184. SORGE, P.
Die Johannisbeersorte "Rote Spätlese". (**The red currant variety Rote Spätlese.**)
Dtsch. Gartenb., 1958, **5**: 293-5, illus.

Yields of Rote Spätlese were much higher than those of Rote Holländische, Vierländer and Heros. Cuttings planted on 6 July in a warm frame rooted better than those taken on 21 May. Growth substances P604 and Wurzelfix increased rooting by 13% and 16% respectively over untreated controls.

1185. GOEDEGEBURE, L.
Rode bessen aan draad. (**Red currants trained on wire.**)
Fruitteelt, 1958, **48**: 1036-7, illus.

Some of the advantages of growing red currants as a hedge trained to wires are earlier bearing, denser population (6,600 bushes per ha.), higher yield and increased content of vitamin C. Capital costs are higher and more labour is required than for the normal system of cultivation.

1186. Berger, R.
Station de démonstration et d'essais du fraisier à Rongy. Résultats de la saison 1956/1957. **(Experimental and demonstration station for strawberries at Rongy. Results of the season 1956/1957.)**
Rev. agric. Brux., 1958, **11**: 743-803.

Growth, fruiting and commercial value of 21 strawberry varieties were studied in their first fruiting season. Graphs show susceptibility to frost damage and subsequent reduction in yield, differences in yields from plots planted before and after mid-August, and the start and duration of fruiting.

1187. Foster, L. J.
Trial of strawberry varieties in Nyasaland.
Rhod. agric. J., 1958, **55**: 551-8, bibl. 6.

Varieties recently imported via Molo, Kenya, viz. Cambridge Early Pine, Cambridge 449 and Melba, together with a local variety Nankunda, produced yields of over 4 short tons/acre. Cambridge Early Pine yielded highest. Closer spacing, early planting and higher irrigation rates contributed to higher yields. Local and imported varieties are described.

1188. Guttridge, C. G., and Thompson, P. A.
Effect of gibberellic acid on length and number of epidermal cells in petioles of strawberry.
Nature, 1959, **183**: 197-8, bibl. 2.

Both length and number of epidermal cells were significantly increased at a light intensity of 1,200 ft. candles during 2 months at a 12-hr. photoperiod. with an initial application of gibberellic acid at 16 μg. per plant, followed by 8 μg. twice weekly. At a light intensity of 800 ft. candles the increases were not significant.—Scottish hort. Res. Inst., Mylnefield, Invergowrie by Dundee.

1189. Ueno, Y.
Effects of fall applications of β-indoleacetic acid and α-naphthaleneacetic acid on strawberries. [Japanese, with English summary 18 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 120-5, bibl. 14.

Autumn applications were made to Kogyoku and Red Star strawberry plants in the years 1953 to 1956. Regardless of season neither IAA nor NAA had any effect on anthesis and harvesting time. Numbers of flowers and fruits were increased by higher concentrations of IAA but inhibited by higher concentrations of NAA. NAA applied before flower formation inhibited flowering and fruiting considerably, but was not so effective when applied after flower formation. IAA increased fruit size, but NAA at higher concentrations had an adverse effect on it.

1190. Skrebtsova, N. D.
The role of bees in pollinating strawberries. [Russian.]
Pchelovodstvo, 1957, **34** (7): 34-6, from abstr. in *Bee World*, 1958, **39**: 302.

Different varieties of strawberries were not visited by bees to the same extent. To obtain 100% fertilization 16–20 visits by bees to each fully developed flower were enough, but more frequent visitation produced heavier berries. Following 16–20 visits berries averaged 5·36 g. in weight and following 21–25 visits 8·13 g. Flowers pollinated at the time their reproductive organs were fully developed produced heavier berries than flowers pollinated before or after this time.

1191. Oele, L. C.
Grondbedekkingsproef bij aardbeien. **(Experiments on soil coverings for strawberries.)**
Fruitteelt, 1958, **48**: 1069.

Caraway straw and barley straw were compared as soil coverings for Deutsch Evern, with bare soil as control. At the first picking yields from all plots were similar, but by the third picking plots covered with caraway straw were cropping the best. Final yield from the caraway straw plot was 92,750 g., of which 64% was first quality, compared with yields of 81,250 g. from bare plots (56% first quality) and of 75,625 g. from barley straw plots (59% first quality). [Plot size not stated.]

1192. Yokomizo, T.
Studies on strawberry forcing. No. 6. On the influence of the amount and time of fertilizer application during propagation. [Japanese, with English summary $\frac{1}{3}$ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1958, No. 6, pp. 41-8.

Runners were grown in soils which had received low or high levels of fertilizer and were then transplanted to beds which had also been prepared using two levels of fertilizer. The plants which were transplanted in September from beds of low fertilizer application to beds of high fertilizer application differentiated flower buds earlier, grew better and yielded larger and earlier crops than plants treated any other way. [For Part 5, see *H.A.*, 28: 1179.] J.R.L.

1193. Novikov, A. A.
Foliar nutrition for strawberries. [Russian.]
Bjul. n.-tech. Inf. nauč. Mičurin isl. In-t. Sadov, 1957, No. 3, pp. 12-16, from abstr. in *Beerenobstschrift.*, 1958, No. 13, p. 6.

Foliar nutrient sprays applied with pesticides to strawberries during fruit formation were effective when soil and leaves were moist. Yields were increased by up to 33% with a solution of 1% urea, 3% superphosphate and 1% bordeaux mixture. When ammonium nitrate was substituted for urea, yield increases were 13–14%.

1194. GOLIKOVA, N. A.
The effect of foliar nutrition on strawberry yields. [Russian.]
Udobr. Urož., 1957, **2**: 30-2, from abstr. in *Beerenobstschrift.*, 1958, No. 13, p. 2.

Foliar nutrient sprays of N, P, K, B, Cu and NPK were given to 2-year-old plants of Komsomolka and Deutsch Evern. Spraying 1,900 l./ha. K_2O plus P_2O_5 during flower bud formation increased yields by 32·5%, and with B sprays yields were increased by 18%. Application of NPK at this time reduced yields by 15%, but when applied at flower bud initiation yields were increased by 21·3%. The following nutrient concentration is recommended: potash salt 1%, boric acid 0·12% and superphosphate 2%.

1195. LOEWUS, F. A., FINKLE, B. J., AND JANG, R.
L-ascorbic acid: a possible intermediate in carbohydrate metabolism in plants.
Biochim. biophys. Acta, 1958, **30**: 629-35, bibl. 31.

The L-ascorbic acid labelling patterns found in detached ripening strawberry fruits that had been stem-fed D-glucose-6-^{14}C and D-glucuronolactone-1-^{14}C are described, as is the sucrose-derived D-glucose labelling pattern found in a berry stem-fed L-ascorbic acid-6-^{14}C. The results: (1) confirm earlier observations that no inversion of the carbon chain occurs between D-glucose and L-ascorbic acid; (2) offer tracer evidence of the pathway of L-ascorbic acid formation in plants first proposed by Isherwood *et al.* (*Biochem. J.*, 1954, 56: 1); and (3), when taken in conjunction with earlier results [*H.A.*, 27: 1016 and 28: 3425], suggest that L-ascorbic acid may be an intermediate in carbohydrate metabolism.—West. reg. Res. Lab., Albany, Calif.

1196. SMITH, W. H., AND MANN, G.
Transport of soft fruit in insulated containers.
Agriculture, Lond., 1958, **65**: 450-3, bibl. 3, illus.

The construction of 2 insulated gastight containers is described, which have been developed for transporting soft fruit after pre-cooling. One is a large container for carrying about 3 tons of soft fruit by road or rail, and, for experimental purposes, it may be equipped with a compressor refrigerator unit. The second, smaller container holds just under 1 cwt. of fruit, and, in practice, fruit in this container received some rough handling. A method of using solid carbon dioxide to precool fruit *in situ* has also been worked out, and the precooling plant may be used for large or small amounts of fruit.—D.S.I.R., Ditton Lab., Larkfield.

1197. MAXIE, E. C., MITCHELL, F. G., AND GREATHEAD, A.
Quality study on strawberries.
Calif. Agric., 1959, **13** (1): 6, 15.

The temperature of Shasta fruits in direct sunlight was higher than that of the surrounding air, but in covered baskets fruit temperatures did not reach those of the surrounding air. Berries were warmed more quickly and reached a higher temperature in moving air than in still air. In moving air there was some skin injury.

Vines.

(*See also* 1231c-f, h, m, p, s, t, 1244, 1374, 2001, 2018b, c.)

1198. VAN NES, A. R., BOS, C., AND KUYVENHOVEN, J.
De druif. (**The grape.**)
Tuinbouwvoorlichting **7**, 1958, pp. 48, illus., fl. 1.75.

The production of glasshouse grapes in Holland has decreased since the war, and figures for home consumption and exports are less than half of those for the period 1935-1939. Reduced consumption is a result of increased price and the steep rise in costs of producing a luxury crop with little opportunity for rationalization. Growing grapes in heated glass is less likely to be profitable than culture in cold glass with an under crop. In comparing costs and returns of grapes and tomatoes in grape-houses, it is shown that in general it is of no advantage to change over to tomato production when average grape yields are being obtained.—Landb.-Econ. Inst., The Hague.

1199. DALMASSO, G.
Disciplina della coltura degli ibridi produttori diretti nei varii paesi. (**Restrictions on growing direct-producing vine hybrids in various countries.**)
Riv. Vitic. Enol., 1958, **11**: 339-46, 375-84.

Member countries of the Office International du Vin were invited to report on their regulations, if any, controlling the import and planting of direct-producing hybrid vines. The replies are discussed. The chief points emerging are that most of the established types are unsuitable for wine production, that their initially high yields gradually, or even somewhat rapidly, decline. In most of these countries their spread has been checked, whereas in others, notably Germany, Spain, Hungary and Tunisia, planting them is strictly prohibited. Production of fruit juices from such hybrids is tolerated in Yugoslavia, Italy, and some cantons of Switzerland. Restrictions appear to be less severe in France, Algeria and Austria, in which countries certain types of direct producers may be used for wine making, provided the nature of the source is clearly displayed on labels. In France, Germany, Italy and Hungary, new hybrid types are being selected for eventual release to growers. Bulgaria, Morocco and the U.S.S.R. are also included in the survey. In the U.S.S.R. the direct producers are mainly confined to the Ukraine and Moldavia, where they will probably be replaced gradually by good European varieties.

1200. PENKOV, M. D.
Growing own-rooted vines in northern Bulgaria. [Russian.]
Agrobiologija, 1958, No. 5, pp. 122-4, bibl. 7.

In the Nikopolsk area on calcareous sandy chernozems certain varieties of own-rooted vines grow and yield satisfactorily in the presence of phylloxera. Extensive soil studies have shown that the soils themselves do not impede the spread of phylloxera, but the vines root very deeply and thus escape infestation. Plants up to 3 to 4 years old, i.e. before much of the root system has penetrated through the phylloxera zone, are vulnerable and hence own-rooted vines should be planted on uninfested sites.

1201. HARTMAIR, V., AND HÖLZL, H.
Über den anatomischen Bau der Sprossachse der Weinrebe (*Vitis vinifera* L.). **(On the anatomical structure of vine stems.)** [English, French and Spanish summaries, 13, 15 and 17 lines respectively.]
Mitt. Klosterneuburg, Ser. A, 1958, **8**: 325-33, bibl. 3, illus.

In view of doubts recently expressed on the existence of a cambial belt in vines, a thorough anatomical study has been made. A description of the differentiation processes in the apex is followed by one of the stem structure. The account of the investigations is supported by illustrations, which show anatomical details extending over several internodes and make it possible—especially taking into account cell proportions characteristic of the cambial belt, the adjacent medullary rays and the living elements in the wood—to locate the cambial zone accurately during the vegetative period. The meristematic character of the cambial zone has thus been proved. During the winter rest, however, none of the sections examined—a total of 2,000—showed a cambial belt, and it was also found to be absent in dormant cherries, peaches, pears and others. Exact measurements allowed conclusions to be drawn with regard to the start of differentiation in the medullary rays. Finally, the existence of albuminous cells in the stem was established by means of double-staining with safranin and haematoxylin. The significance of these cells is discussed. [Translation of authors' German summary.]

1202. VASIL'EVA, Z. V.
The photosynthesis of certain varieties of vine under conditions of the Moscow region. [Russian.]
Bjul. gl. bot. Sada. AN SSR, 1956, No. 24, pp. 51-8, bibl. 17, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,127.

Photosynthetic activity determinations were made in the leaves of 4 vine varieties by the half-leaf method. Activity was highest in the varieties Amurskij [*Vitis amurensis*] and Alfa [*V. labrusca* × *V. riparia*] between 7 and 11 a.m. and in the varieties Bujrut and Korinka Mičurina between 11 a.m. and 1 p.m. In all varieties the intensity of photosynthesis declined gradually toward the end of the vegetative period and sharply at the end of August. During the first half of the season the early ripening varieties Alfa and Amurskij had a higher photosynthetic activity than the other two varieties. [See also *H.A.*, 28: 2266.]

1203. BRÜCKBAUER, H.
Frostwiderstandsfähigkeit der Winterknospen der Amerikanerreben und der Einfluss der Unterlage auf die Frostresistenz des Edelreises. **(The frost resistance of the winter buds of American vine rootstocks and the influence of the rootstock on the frost resistance of the scion.)**
Wein-Wiss., 1956, **10**: 84-94, 129-38, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. p. 64.

After the winter of 1955/56 no influence of the rootstock on the frost resistance of the scion was apparent, but adventitious buds near the top were found to have suffered slightly more than those nearer the ground. The method of assessment of winter injury to the buds was shown to be faulty as many more buds recovered than had been expected. Of the rootstocks, 125AA was affected worst, while 8B and 5C suffered least.

1204. DRAGAŠ, M., AVRAMOV, L., AND MILOSAVLJEVIĆ, M.
A study of the more important morphological characteristics of seeds in some vine varieties. [Yugoslav, with English summary 1 p.]
Zborn. Rad. poljopriv. Fak. Belgrade, 1958, **6** (1): 135-50, bibl. 9, illus.

Among the seed characteristics studied were shape, length, width, thickness, width: length ratio and weight. These varied considerably both between and within the 24 varieties examined, but in some cases were constant enough to serve in identifying origin.

1205. BRANAS, J.
Méthodes de description ampélographique et leur valeur pour l'identification des variétés. **(Methods of ampelographic description and their value for identifying varieties.)**
Bull. Off. int. Vin, 1959, **31** (335): 18-41, illus.

Artificial systems of classification and general methods of identification are discussed. Ampelometry has very limited application for identification, which demands the collection of large numbers of samples of reference. The importance of the international ampelographic register is emphasized.

1206. Cejko, A. I.
A coefficient of water requirement of vines and its practical value for viticulture. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (8): 19-24, bibl. 14.

As a result of 3 years' experiments in the Crimea it was found that the ratio of seasonal transpiration: yield per unit area was sufficiently constant within a vine variety to permit of this coefficient being used to calculate the irrigation requirement for a given yield.

1207. Kobayashi, A., and others.
Growth and yield of grapes as related to soil reaction. II. [Japanese, with English summary 27 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 1-9, bibl. 5.

Soil in which 2- to 3-year-old Delaware vines were growing was adjusted by the addition of slaked lime and flowers of sulphur and the optimum pH for growth of the 2-year-old plants was found to be 6·0–5·6 and that for the 3-year-old 7·6–7·2. The lower the pH in the soil the less replaceable Mg was found in the soil and the more severe were the Mg deficiency symptoms in the leaves. The addition of $Ba(OH)_2$ to regulate pH checked growth. [See also *H.A.*, 28: 211.]

1208. Fuss, F., and Thiele, K.
Einfluss von Gründüngung und Bodenbedeckung mit Rapsstroh auf die Temperatur der obersten Bodenschicht. **(The effect of green manuring and soil covering with rape straw on the temperature of the top-soil.)**
Dtsch. Gartenb., 1958, **5**: 295-7, 320-1, bibl. 14.

Temperatures below 0° C., taken at 8 a.m. at 5 cm. depth in an old vineyard soil, were recorded on only 9 days from December to April under a rape straw covering. In uncovered soil the equivalent number of days was 56, while in soils growing green manures (vetch and/or mustard, crimson clover or lupin) the numbers were between 43 and 53.

1209. Carrante, V.
Anomalie sulla vite e loro riflessi biologici. **(Anomalous conditions for vines, and their biological results.)**
Ital. agric., 1959, **96**: 11-15, illus.

The effects of cold weather in March and April 1958, following exceptionally mild weather in February, are discussed and illustrated, with reference to table and wine varieties. Where flowering was advanced, small grapes developed on very meagre bunches, but where it was delayed, exceptionally large and full bunches were produced.

1210. Cosmo, I., and Pieri, G.
Prove di radicamento di talee semplici e innesti-talea preparati con materiale proveniente da viti trattate con anticrittogamici acuprici e cuprici. **(Experiments on rooting of ordinary cuttings and grafted cuttings, prepared with material derived from vines treated with copper and non-copper fungicides.)**
Riv. Vitic. Enol., 1959, **12**: 13-17, bibl. 3, illus.

The treatments, carried out during 3 consecutive years, were:—1% bordeaux mixture, 0·3% captan, and 0·3% zineb. Cuttings were taken the following spring, left in a forcing frame for 6½ weeks and then transferred to pots and examined a month later. Each group comprised 8 bench-grafted and 10 ordinary cuttings. In the bordeaux group, feeble rooting was achieved in 7 grafted and 6 ordinary cuttings, but only very small leaves were present. In the captan group only 50% of the cuttings were rooted, none very strongly, and the leaves were of moderate size. Stronger and more numerous roots and distinctly greater shoot growth was found in 6 grafted and 7 ordinary cuttings of the zineb group, but slight chlorosis was evident. In no case did rooting extend beyond the basal node.

1211. Konlechner, H.
Langsamkrümler im weinbaulichen Einsatz. **(A slow acting soil pulverizer for the vineyard.)**
Mitt. Klosterneuburg, Ser. A, 1958, **8**: 281-8, bibl. 2, illus.

In the course of trials on mechanization in viticulture, especially in widely spaced vines (trellis culture), the "Rotorkrümler" RKB 270 on Steyr tractors 80s and 84 proved very satisfactory for soil cultivation as well as for the incorporation of fertilizers and green manure in the soil.

1212. Victor, —.
Mécanisation de la viticulture. Allemagne. Rapport national. **(Mechanization in viticulture. Germany. National report.)**
Bull. Off. int. Vin., 1958, **31** (334): 59-66.

Progress in, and the economics of, mechanizing soil cultivation and harvesting are discussed. Tests are in progress on mechanical and pneumatically controlled scissors for pruning and tying operations.

1213. Peyer, E.
Versuche zur Verhütung von Schwemmschäden im Rebbau und deren Messung. **(Studies on the prevention of erosion in vineyards and its measurement.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 597-603, bibl. 2, illus.

Erosion in a steeply sloping vineyard was markedly reduced by the incorporation of 2–4 cu. m. per are of composted town waste into the top soil. The physical characteristics of the soil were improved by compost incorporation. Costs of application have been calculated.—Eidg. Versuchsanst., Wädenswil.

1214. Dragaš, M.
The effect of granulated superphosphate on the yield of grapes and the sugar content of the must. [Yugoslav, with German summary 1 p.]
Zborn. Rad. poljopriv. Fak. Belgrade, 1957, **5** (2): 75-84, bibl. 6.

In experiments with 2 vine varieties superphosphate in granulated form gave higher yields and higher contents of sugar and phosphoric acid than the same amount in powder form.

1215. Subbotovič, A. S.
The nutrition of vine grafts in the nursery. [Russian.]
Sadov. Vinograd. i Vinodelie Moldavii, 1956, No. 6, pp. 52-4, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,760.

In experiments in Moldavia the highest percentage of first grade transplants was obtained when a complete fertilizer was applied early in July and early in August. This treatment increased the sugar, including reducing sugar, content of shoots. Application of N and P only, on the same dates, reduced the contents of reducing sugars and sucrose. Starch accumulation in the shoots varied considerably depending on the dates and frequency of treatment.

1216. Manaresi, A., and Capucci, C.
Nella vite sono più fruttiferi i tralci grossi o quelli sottili? **(Are thick or slender vine shoots the more productive?)**
Riv. Vitic. Enol., 1958, **11**: 346-9, bibl. 18.

Experiments in the Emilia-Romagna province of Italy showed that, in general, the thicker the basal shoots retained after pruning, the greater was the number of fruit bunches produced, but in the varieties Trebbiano romagnolo and Raboso veronese shoots of 16 mm. or more in diameter were slightly less fertile than those of 11–15 mm. This general conclusion was applicable not only to basal, but to all shoots.

1217. Dobroljubskij, O. K., and Slavvo, A. V.
The effect of the trace element zinc on enzyme activity in vines, [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **121**: 370-3, bibl. 9.

Two treatments with $ZnSO_4$ at 5 mg. per vine, applied in the bordeaux spray, increased the ascorbinoxidase, polyphenoloxidase and peroxidase activity in both leaves and fruit. Similar results were obtained when Zn was sprayed alone or applied to the soil. Zn also increased the ascorbic acid content of the leaves without affecting the pattern of seasonal distribution. In the grapes of 3 varieties studied ascorbic acid was increased from 1·9–6·4 mg.% to 8·2–8·7 mg.%.

1218. Lelakis, —.
Effet de l'effeuillage sur l'état alimentaire de la vigne controlé par le diagnostic foliaire. **(The effect of defoliation on the nutritional status of the vine observed by foliar diagnosis.)**
C.R. Acad. Agric. Fr., 1958, **44**: 707-15, bibl. 3.

Defoliation, carried out during ripening, caused a reduction in nutritional status mainly due to a lowering of N content, P and K contents remaining practically unchanged. The detrimental effect is shown graphically and a regression equation calculated.

1219. Briza, K., and Milosavljević, M.
A method of forecasting vine yields. [Yugoslav, with German summary 1 p.]
Zborn. Rad. poljopriv. Fak. Belgrade, 1958, **6** (1): 151-8, bibl. 7.

This method, based on the estimation of the fruitfulness of buds during dormancy which determines the severity of pruning [see *H.A.*, 25: 2546] and the average weight of bunches of individual varieties, has given very promising results in 1956 and 1957 for the vine growing region of Vršac. The actual yields per plant for 6 varieties in 1957 averaged 5·8% below the estimated yields.

1220. Maltabar, V. M.
Optimum dates for harvesting cognac grapes. [Russian.]
Sadov. Vinograd. i Vinodelie Moldavii, 1956, No. 6, pp. 46-9, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,761.

The best quality brandy was obtained using wine prepared from grapes picked when fully- but not over-ripe. Grapes should be picked when the sugar content and aroma are at their highest and the titratable acid content medium high, at which time the maturity index (% sugar in juice) stops rising.

Nuts.

(*See also* 1231a, g.)

1221. Pastore, R.
Il mandorlo. **(Almonds.)**
Ital. agric., 1958, **95**: 757-67, bibl. 11, illus.

Annual production figures for 1950-57 inclusive are quoted for Italy. Italian, other European, and Californian varieties are illustrated. The necessity for research on varietal pollination and for improving cultural practices is stressed.

1222. Evréinoff, V. A.
Contribution à l'étude de l'amandier. **(Contribution to the study of the almond.)**
Fruits et Prim., 1958, **28**: 99-104, bibl. 30.

Fourteen species of *Amygdalus*, with their synonyms, are described and 5 systems of classification reviewed. The origin of the almond is also considered.

1223. Gerritsen, C. J.
De amandel. **(The almond.)** [English summary 18 lines.]
Meded. Dir. Tuinb., 1958, **21**: 771-2, bibl. 6, illus.

Selections tested under Dutch conditions were unsuitable for commercial growing, but the variety No. 5404 is recommended for private gardens.—Inst. Vered. Tuinbouwgew., Wageningen.

1224. Raptopoulos, T., and Kantarzis, N.
Four late-flowering almond varieties. [Greek, with English summary ½ p.]
Yearb. Agric. For. School. arbor. Lab. Univ. Thessaloniki, 1958, pp. 3-22, bibl. 1, illus.

The almond varieties which escape spring frost damage in northern Greece are Retsou, Princesse, Texas and Truoito. These varieties have good growth and fruiting qualities and belong to a compatible cross-pollinating group.

1225. Raptopoulos, T., and Kantarzis, N.
Varietal resistance in almond trees to spring frosts. [Greek, with English summary ¼ p.]
Reprinted from *Geoponika*, 1958, No. 48, pp. 226-32, bibl. 3, illus.

The critical period for almond varieties in northern Greece is the first fortnight in March, and varieties whose main flowering period is later than this escape much of the frost damage and give a fairly good crop. Flowers more than 2 m. above ground level are less damaged than lower flowers, thus high working is recommended in areas liable to frost. Frost injury was not related to flower orientation. Four almond varieties are recommended for planting in northern Greece.—Thessaloniki Univ. exp. Farm.

1226. Solignat, G.
Observations sur la biologie du châtaignier. **(Observations on the biology of the sweet chestnut tree.)** [English, German and Russian summaries ½ p. each.]
Ann. Amél. Plantes, 1958, **8**: 31-58, bibl. 9.

Studies showed that in general chestnuts are only weakly self-compatible. Some plants are male-sterile because there is no pollen or abnormal pollen, and some are more or less female-sterile. Intercompatibility varies according to the varieties involved, and to differences between the flowering period of the male flowers and the optimum time for fertilization of the female flowers. Differences in annual biological cycles depend on variety and locality.—Stat. Amél. Châtaignier, Brive.

1227. (Painter, J. H.)
Pruning may hold key to filbert production.
Bett. Fruit, 1959, **53** (5): 6, 8.

Filbert twigs 6½–9½ in. long produced an average of 5 times as many nuts as twigs 3¼–6¼ in. long, and the latter produced 6 times as many nuts as twigs of 3 in. or less. Nearly 70% of the filberts harvested were produced on twigs over 6¼ in. long, which were 11% of the total twig number. It is suggested that systematic pruning may stimulate vigorous shoot growth.—Ore. St. Coll.

1228. de la Rocha G., G.
El pecano. **(Pecans.)**
Circ. La Molina **73**, 1958, pp. 22, bibl. 10, illus.

Nut composition, varieties, climate and soil requirements, propagation, transplanting, fertilizing, pruning and harvesting are described. The most successful propagation method was single tongue grafting [see also *H.A.*, 28: 219y.]

1229. Gardner, F. P., and Brooks, O. L.
Comparison of three winter grazing mixtures in a pecan orchard of the Georgia coastal plain.
Agron. J., 1958, **50**: 716.

The mixtures compared were:—(*a*) rye and vetch, (*b*) oats, ryegrass and crimson clover, and (*c*) oats and vetch. Pecan yields were not specifically recorded, but the crop following the first grazing season of all 3 was exceptionally heavy probably owing to residual fertilizer and animal droppings.

1230. Purcelean, Ş.
Influenţa mărimii seminţelor şi a adîncimii de semănare asupra creşterii puieţilor de nuc negru (*Juglans nigra* L.). **(The effect of seed size and depth of sowing on the growth of black walnut (*Juglans nigra*) seedlings.)**
Rev. Pădurilor, 1956, **71**: 812-14, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 11,009.

Large seed (3·5×4·0×2·5 cm.) produced more vigorous 1-year-old seedlings than small seed (3·0×2·5×2·0 cm.). The highest rate of germination (68%) was obtained from sowing large seed 8 cm. deep.

Noted.

1231.

a. Baldini, E.
Indirizzi dell'olivicoltura e della mandorlicoltura in Spagna in rapporto al problema della economia idrica. **(Trends in olive growing and almond growing in Spain in relation to the problem of water management.)**
Frutticoltura, 1958, **20**: 617-33, bibl. 16, illus.

b Blauw, P.
De rode bes "Maarse's Prominent". **(The red currant variety Maarse's Prominent.)**
Groenten en Fruit, 1958, **14**: 191, from abstr. in *Beerenobstschrift.*, 1958, No. 12, p. 13.
Recommended for extended commercial planting in Holland.

c Bovay, E.
Le diagnostic foliaire, moyen de contrôle de la nutrition de la vigne. **(Leaf analysis, a means of supervising vine nutrition.)**
Rev. romande Agric. Vitic., 1958, **14**: 87-9.
Its use in interpreting the results of an NPK experiment.

d Bruni, B.
Cannonao. Nasco. Montonico bianco. Pecorino. Semidano. **(Vine varieties Cannonao, Nasco, Montonico bianco, Pecorino and Semidano.)** [English summaries 3 lines each.]
Ann. Sper. agrar., 1958, **12** (4), Suppl. pp. LIII-LIX, bibl. 11, illus., LXI-LXVIII, bibl. 7, illus., LXIX-LXXV, bibl. 5, illus., LXXVII-LXXXIV, bibl. 5, illus., LXXXV-XCI, bibl. 9, illus.
Wine varieties, white except for Cannonao which has dark-skinned fruit.

e Cosmo, I., and Polsinelli, M.
Schiave. Prosecco. **(Grapevine varieties of the Schiava type. The variety Prosecco.)** [English summaries 4 and 3 lines.]
Ann. Sper. agrar., 1958, **12** (4), Suppl. pp. XV-XLII, bibl. 12, illus., and pp. XLIII-LII, bibl. 6, illus.
Descriptions of Schiava gentile, S. grigia, S. grossa and Tschaggele which are dark-skinned wine grapes. Prosecco is a white wine grape.

f Del Gaudio, S., and Ciasca, L.
Uva di Troia. **(The vine variety Uva di Troia.)** [English summary 3 lines.]
Ann. Sper. agrar., 1958, **12** (4), Suppl. pp. XCIII-XCVIII, bibl. 8, illus.
A dark-skinned wine variety.

g Galle, G.
Chestnuts can be a profitable undertaking.
Fmg S. Afr., 1958, **34** (9): 50-2, illus.
Includes a note on propagation.

h Hubáček, V.
Výsledky hromadného výběru (selekce) révy vinné. **(Results of mass selection of vines.)** [Russian and German summaries ½ p. each.]
Věd. Práce výzk. Úst. rostl. Výroby, ČSAZV, 1958, **4**: 43-50, bibl. 5, illus.
Details of 6 years' work on 3 varieties.

i Hull, J. W.
The development of colchicine-induced and natural polyploid breeding lines in the genus *Rubus* (Tourn.) L.
Diss. Abstr., 1958, **19**: 24-5, being *L.C. Card No. Mic.* 58-2215 of 130 pp.
Colchiploidy increased fruit size.

j Jehn, A.
Wie kann der Erfolg im Erdbeeranbau weiter verbessert werden? **(How can success in strawberry growing be further exploited?)**
Rhein. Mschr. Gemüse-, Obst- u. Gartenb., 1958, **48**: 263-6, from abstr. in *Beerenobstschrift.*, 1958, No. 13, pp. 3-5.
In comparing 4 methods of culture, the highest yields in both one-year and two-year plots were obtained with a plant spacing of 10 cm.

k Kronenberg, H. G.
Balans van ervaringen met nieuwere aardbeirassen in de open grond. **(Trials with newer strawberry varieties in the open.)**
Fruitteelt, 1958, **48**: 1086-8, illus.
Mainly English and German varieties.

l Kubatzki, —.
Über das Mulchen von Erdbeerkulturen. **(On the mulching of strawberries.)**
Taspo, 1957, **87** (31): 7, from abstr. in *Beerenobstschrift.*, 1958, No. 12, p. 5.
Mulching with the plastic foil Waloplast described.

m de Lorenzo, F.
Innesto ad incastro con gemma. **(Inlay bud grafting.)**
Riv. Vitic. Enol., 1958, **11**: 307-14, bibl. 5, illus.
The technique is described for vines.

n Metzner, R., and Scherr, F.
Johannisbeervergleichspflanzung. **(A comparative planting of currant varieties.)**
Obstbau, 1958, **77**: 133-4, from abstr. in *Beerenobstschrift.*, 1958, No. 12, pp. 14-15.
A comparison of red, white and black varieties for the years 1953-57 inclusive.

o (New York State Fruit Testing Association.)
New blackberry varieties.
Amer. Nurserym., 1958, **108** (5): 90.
Bailey (fruiting early August) and NY24338 (midseason).

p Ribéreau-Gayon, P.
Formation and evolution of anthocyanins during ripening of grapes. [?French.]
C.R. Acad. Sci., Paris, 1958, **246**: 1271-3, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-42.

q ROELOFSEN, B.
Blauwe bessen in 1958—resultaten van de proefvelden. **(Blueberries in 1958—results from the test plots.)**
Fruitteelt, 1958, **48**: 1035, illus.
Yield figures for 8 varieties at Sloten. Concord gave the highest yield, followed by Dixi.

r TARASENKO, M. T.
The propagation of currants and gooseberries by leafy (softwood) cuttings. [Russian, with English summary 6 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 5, pp. 125-48, bibl. 28, illus.
Results of long-term experiments on rooting softwood cuttings of black- and red-currants and gooseberries.

s TURKOVIĆ, Z.
Neuere Forschungen über die *Vitis silvestris* Gmel. **(Recent studies on *Vitis silvestris*).** [English, French and Spanish summaries 8-10 lines each.]
Mitt. Klosterneuburg, Ser. A, 1958, **8**: 319-25, illus.
Phenological and ecological studies on seedlings from Hercegovina.

t WALTERS, D. V.
Commonwealth Research Station, Merbein.
Food Pres. Quart., 1958, **18**: 56-60.
Work on dried vine fruits, mainly sultana dipping and drying.

u WASSENAAR, L. M.
Ervaringen en rassenonderzoek met zwarte bessen. **(Experience and variety trials with black currants.)**
Fruitteelt, 1958, **48**: 1043-4, 1047, illus.
Frost susceptibility, ease of picking and vitamin C content of 18 varieties.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 1323f, h, r, s, 1341, 1342, 1987, 1995, 2018g.)

1232. BIÉLER, P.-L., AND SAVARY, A.
La météorologie au service de l'agriculture. **(Meteorology in the service of agriculture.)**
Reprinted from *Rev. tech. suisse*, Nos. 46, 47, 48 and 52, pp. 35, illus.

The importance of meteorology for pest and disease control is discussed, with special reference to fruit trees. Observations were made from 1953 to 1955 at Cointrin and Saxon in Switzerland, in which meteorological records and the developmental stages of pests and diseases were compared, and on which future control measures may be based.

Disturbances of nutrition or of unknown origin.

(*See also* 1103, 1104, 1324b.)

1233. BAXTER, P.
Nutrition of fruit trees. A guide to the fertilizer requirements of deciduous orchards in Victoria.
[*Publ.*] *Vict. Dep. Agric.*, 1958, pp. 23, bibl. 25, illus.

The author describes, with some coloured pictures, deficiencies of N, K, P, Mg, Ca, Fe, Zn, Mn, Cu, and B, and salt toxicity, which have occurred in top fruit in Victoria. Brief control measures are given in each case, and general fertilizer recommendations made for northern and southern areas of Victoria.

1234. GRASMANIS, V. O.
Manganese excess and bark necrosis in pears. Manganese excess and bark necrosis in apples.
J. Aust. Inst. agric. Sci., 1958, **24**: 347-9, bibl. 3, and 350-1, bibl. 4.

Conditions known as papery bark in pears (an internal necrosis with a cracking of outer bark and rolling of the cuticle) and measles in apples (an internal necrosis with elevated pustules, brown discoloration and some cracking) were shown to be due to Mn excess by comparing Mn contents of affected and healthy trees and by injections into healthy limbs.

1235. BERG, A., CLULO, G., AND ORTON, C. R.
Internal bark necrosis of apple resulting from manganese toxicity.
Bull. W. Va agric. Exp. Stat. **414T,** 1958 pp. 28, bibl. 31, illus.

Internal bark necrosis is of primary importance in the Delicious apple and its sports. Its first symptoms are small elevations on the epidermis and young bark, which, if cut open, show dead areas within the cortex and inner bark often extending into the wood. Later the older bark becomes rough and scaly, and the affected limbs unthrifty: death often follows. The cause is excess manganese absorption from the soil and occurs generally in trees growing in soils of high manganese content which are in most cases highly acid. It has never been observed to develop in experimental soils with a pH higher than 5·3 and the maintenance of a pH of at least 5·5 is therefore recommended. Fertilizers whose use renders the soil more acid should be used only with caution. In addition sodium nitrate was found to favour development of the disease. The application of lime and other neutralizing substances reduces the availability of manganese and so the danger of the necrosis.

1236. Wurgler, W., and Staehelin, M.
Contribution à l'étude du dépérissement de l'abricotier. **(Contribution to the study of apricot dieback.)** [German, English and Italian summaries 10–12 lines.]
Landw. Jb. Schweiz, 1958, **7**: 503-25, bibl. 56, illus.

The authors describe the winter climate in Valais and examine the effect of frost, pruning and spraying on apricot trees. The damage due to these agents and to various parasites is primarily a tissue necrosis. The necrotic zones disorganize the cambial activity which tends to form, instead of the normal xylem, a spongy parenchyma devoid of vascular bundles, in which a gummosis quickly develops. This reaction is much amplified when copper salts penetrate a fresh wound; it is less severe if the wound is covered with wax. The gummed tissue contained in the callus, which is formed around the necrotic areas, may modify the activity of the cambium and the growth of next year's wood. This contributes to the formation of cankers, which cause the dieback of branches or entire trees. [From authors' summary.]

1237. Fritzsche, R.
Beiträge zur Ätiologie des Himbeerrutensterbens. **(Contribution to the aetiology of raspberry cane die-back.)** [Russian and English summaries ¼ p. each.]
Arch. Gartenb., 1958, **6**: 171-216, bibl. 41, illus.

The cause of cane die-back is considered to be physiological, mainly adverse soil moisture conditions, with mechanical injury a possible contributory factor. The effect of varying soil moisture during flowering was most injurious. Characteristic symptoms of die-back appear during the second year of growth, and the presence of cane midge (*Thomasiniana theobaldi*), bark splits, and various fungi contribute to the disease complex, though the presence of all these factors is not necessary for symptoms of die-back to develop. Application of a straw mulch, which reduced variations in soil moisture, resulted in less bark splitting, and therefore less secondary infection.—Inst. Phytopath., Aschersleben.

1238. Lockhart, C. L.
Symptoms of mineral deficiency in the lowbush blueberry.
Plant Dis. Reptr, 1959, **43**: 102-5, bibl. 2.

Lowbush blueberries were grown in sand culture with mineral solutions deficient in N, P, K, Mg, Ca, S and Fe. Symptoms resulting from deficiency of the major elements were similar to those found in other crops. Growth of blueberry, calculated on a dry weight basis, was significantly reduced in plants grown in solutions deficient in Ca, N, Mg, S, and P, but K and Fe deficiency did not reduce growth significantly.—Canada Dep. Agric., Ottawa.

Climatic factors.

(*See also* 1015, 1100, 1106-1111, 1203, 1209, 1323e, i, q, z, 2018i.)

1239. Witte, K., and Pogrell, H.
Untersuchungen über den Einfluss des Windes auf die Pflanzentemperatur bei der direkten Frostschutzberegnung. **(Studies on the effect of wind on the temperature of plants irrigated by sprinkler for frost protection.)**
Rhein. Mschr. Obstb., 1958, **46**: 195-7, from abstr. in *InformDienst Weihenstephan*, 1958, No. 10, p. 177.

Observations in the field showed that late frosts combined with a wind velocity exceeding 2·5 m./sec. rarely occur in Western Germany. A rate of precipitation by sprinkler of 1–1·5 mm. per hour afforded frost protection at —4° C. only in the absence of wind. However, an increase in the amount of water applied to the plants compensated for any reduction in the protective value of the treatment due to wind. Thus, a rate of precipitation of 4–4·5 mm. per hour was required at —3·5° C. if the wind velocity was 1·8 m./sec.

1240. Trienes, H.
Windschutzhecken im Windkanal. **(Hedges used as windbreaks in the wind tunnel.)**
Met. Rdsch., 1957, **10**: 88-93, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. pp. 40-1.

Experiments with models showed that shelter belts of 50% permeability achieved the best wind protection. The conversion factor for model experiments and evaporation from soils behind shelter belts are also discussed.

1241. Semenov, G. S., and Luk'jančuk, A. F.
Dimensions of blocks and the structure of orchard shelter belts. [Russian.]
Sad i Ogorod, 1959, No. 1, pp. 51-2.

It is stated that the effect of a shelter belt extends to a distance of 25 times its height on the leeward and 10–15 times on the windward side. Thus with a shelter belt of trees 20 m. high or taller, and about 600 m. long, the area of the protected block would be 20–25 ha. The lay-out should be such as to allow mechanical cultivation and the area under fruit trees not less than 90%, the rest being shelter belts and roads.

1242. Weise, R.
Nächtliche Luftzirkulation im Weinberg. **(Air circulation in the vineyard at night.)**
Weinberg u. Keller, 1957, **4**: 329-39, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. pp. 37-8.

Berg had shaken the confidence of experts in the hypothesis of lakes of cold air forming nightly at the bottom of valleys by proving that actually no cold air travels down the slopes during the night (*Z. Meteor.*, 1951, **5**: 229). The planting of shelter belts for protection against spring frosts therefore appeared to be a measure of doubtful value. The present author, however, showed with the aid of soap bubbles that a current of cold air passes down the slopes of vineyards in the late afternoon—when the balance of radiation becomes negative—and that this movement stops at or soon after sunset. At about that time two systems of circulation develop at the bottom of the valley, one above the other. As a result of inversion occurring in the early evening no exchange takes place between the two bodies of air and a supply of warm air to the bottom layer from higher up is barred by the top layer. Consequently, the air of the bottom layer remains very cold until the sun rises again. These observations explain the effectiveness of plant barriers against cold air currents for the protection of vines growing near the bottom of a valley.

1243. NIKONOVA, A. S., AND LAHTIONOV, A. F.
Protecting strawberries from unfavourable winter conditions. [Russian.]
Sad i Ogorod, 1958, No. 10, pp. 47-52, illus.
The first author describes how in the Urals hardy varieties of strawberry can be grown with shelter belts and between rows of currants or of maize, the stems of which are not cleared until the spring. When at the end of October the temperature falls to −5° C., the strawberry plants are covered with reeds, straw or dry potato haulms, with cut branches placed on top to prevent the snow from being blown away. The second author deals with strawberry cultivation in the Primorsk [Far East] region, where the matted system of growing is practised. After fruiting, sorghum or oats are sown between the rows or beds and mulched down to produce a cover for the winter.

1244. VORONCOV, A. T., AND MEL'NIKOV, V. I.
A trial on mechanized laying and covering of vines. [Russian.]
Sad i Ogorod, 1958, No. 12, pp. 55-8, illus.
A schematic illustration is given of a vine-layer mounted on a plough and consisting of 2 wooden rollers, one on each side, which guide and flatten the shoots so that they can be covered by the furrow. Damage to plants is no greater than that due to manual work and the speed is much greater.

1245. THIEL, A.
Erfahrungen mit der Frostbekämpfung im Weinbau durch Geländebeheizung. **(On the control of spring frost in vines by area heating.)**
Weinberg u. Keller, 1958, **5**: 107-20, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. pp. 64-5.
Observations, meteorological records and financial returns over 30 years in the Saar and upper Moselle areas have shown frost protection by heaters to be economically sound.

1246. GARGIULO, A.
La poda de viñedos helados en base al hábito de fructificación de variedades viníferas. **(Pruning frost damaged vines according to the fruiting habits of wine varieties.)**
Idia, 1958, No. 128, pp. 7-18, bibl. 7, illus.
The 31 varieties involved in the experiment are divided into 3 categories according to whether they gave the highest yields after pruning, (1) by removing all the green buds, (2) leaving only one green bud per shoot, always at the end of a short internode, or (3) leaving 2–5 such buds, depending on the plant's vigour.

1247. WEISE, R.
Physikalische und wetterkundliche Voraussetzungen für eine erfolgreiche Frostschutzberegnung. **(Physical and meteorological prerequisites for frost protection by sprinkler irrigation.)**
Weinberg u. Keller, 1958, **5**: 99-107, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. p. 67.
Recommendations include increasing air humidity by the use of windbreaks in order to reduce transpiration.

1248. BELTRAM, V.
Bor als Frostschutz. **(Boron for frost protection.)**
Allg. Forstz., 1958, **13**: 147-8, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. p. 64.
Spraying with a 0·5% borax solution increased resistance to spring frost in forest trees, fruit trees and vines. To prevent the closing of the stomata the treatment had to be carried out at a minimum temperature of 8° C. It remains to be seen whether fruit trees which show flowers but no leaves at the time of the borax application can also be protected. [Work is now in progress at the Botanical Institute at Innsbruck.]

1249. RUI, D.
Consuntivo sulla difesa antigrandine eseguita in Italia nel 1957. **(Appraisal of hail protection measures carried out in Italy in 1957.)**
Agric. Venezie, 1958, **12**: 643-7.
Protection of fruit trees from hail by means of rockets cost on the average L. it. 603·75 per ha. [about 2s. 6d. per acre]. It was unsatisfactory in only 2%, and highly satisfactory in 61%, of the instances examined. [See also *H.A.*, 28: 1229.]

Viruses.

(*See also* 1323g, 2011.)

1250. CANOVA, A.
Le virosi delle piante da frutto. **(Viruses of fruit trees.)**
Frutticoltura, 1958, **20**: 609-16, illus.

Symptoms are described for various types of mosaic and stony pit in pears, for the quince virus which causes deformity, green spotting and internal cork of fruits, and for almond mosaic. The quince disease has apparently not been described previously, but seems similar to a form of degeneration occurring in the apple variety Abbondanza. The almond varieties Montrone, Tuono, Bianca and Noce are much reduced in yield by mosaic.

1251. Bovey, R.
Observations et expériences sur quelques maladies à virus du pommier et du cognassier. (**Observations and experiments on some virus diseases of apple, pear and quince.**) [German, English and Italian summaries 8–10 lines.]
Landw. Jb. Schweiz, 1958, **7**: 527-40, bibl. 7, illus.

The virus diseases of pome fruits encountered in French-speaking Switzerland are surveyed. Although most apples were found to be infected with latent rubbery wood virus, healthy trees of 8 varieties were discovered.

1252. Way, R. D., and Gilmer, R. M.
Pollen transmission of necrotic ring spot in cherry.
Plant Dis. Reptr, 1958, **42**: 1222-4, bibl. 10.

Five out of 18 cherry seedlings from a cross of healthy English Morello (♀)×virus-infected Montmorency (♂) were found to be infected with necrotic ring spot virus. Fifteen seedlings from a similar cross, but with both parents healthy, were all virus free. The possibility of transmission of NRSV to healthy trees through infected pollen and the significance of this in a virus control programme are discussed.—N.Y. St. agric. Exp. Stat., Geneva

1253. Cochran, L. C., and Pine, T. S.
Present status of information on host range and host reactions to peach mosaic virus.
Plant Dis. Reptr, 1958, **42**: 1225-8, bibl. 1.

Susceptible and immune species of *Prunus* are listed and over 200 peach varieties are grouped according to their relative reaction to peach mosaic.—Agric. Res. Serv., Orlando, Fla.

1254. Stalder, L., and Schütz, F.
Virusfreie Erdbeeren. (**Virus-free strawberries.**)
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 30-5, 53-61, bibl. 27, illus.

Work at Wädenswil is described on the production of virus-free strawberries by heat treatment and on the propagation of healthy plants for the trade. The treatment consists of exposure to 38–39·5° C. for 18–20 days (or longer) followed by gradually decreasing temperatures. Under these exacting conditions only 20–40% of the plants survive.

1255. Lister, R. M.
Preparation of virus antisera from strawberry.
Nature, 1958, **182**: 1814, bibl. 4.

A technique is described which removes the tanning agents from the tissues during maceration thus enabling antisera to be prepared directly from rosaceous hosts.—Scottish hort. Res. Inst., Invergowrie, Dundee.

1256. Ochs, G.
Untersuchungen und experimentelle Versuche über die Sortenanfälligkeit von Reben gegen Viruskrankheiten. (**Observations and experiments on the varietal susceptibility of vines to virus diseases.**) [English, French and Spanish summaries 8 lines each.]
Mitt. Klosterneuburg, Ser. A, 1958, **8**: 313-18, bibl. 30.

It has been found that the vine varieties commonly grown in Germany differ in their susceptibility to the three virus diseases making up the infectious degeneration complex [*H.A.*, 28: 2340]. This divergence is seen in differences in the duration of the latency period during which no symptoms appear on the plants. No variety was immune. In contrast to European vines, American vines exhibited unspecific symptoms when infected with panachure or yellow mosaic.—Bot. Inst. Univ. Freiburg i. Br.

1257. Ochs, G.
Untersuchungen über den Einfluss eines phytopathogenen Virus auf den Wuchsstoffhaushalt der Rebe. (**Studies on the effect of a pathogenic virus on the growth substance content of the vine.**)
Naturwissenschaften, 1958, **45**: 343, from abstr. in *Z. PflKrankh.*, 1959, **66**: 29-30.

Deformed growth of vines was a result of the presence of a virus acting on the enzyme which regulates growth substance metabolism. Growth substance contents of main shoots of stunted, diseased plants were 100 times those of healthy vines. A very low, growth-stimulating concentration of heteroauxin was present in shoots that had grown out abnormally, while a high inhibitory concentration was present in dormant axillary buds. Differences in the severity of the infection were reflected in corresponding growth substance contents. Symptoms of deformed growth were reproduced in all stages by incremental, external applications of growth substances.

1258. Caudwell, A., and Ottenwaelter, M.
Deux années d'études sur la flavescence dorée, nouvelle maladie grave de la vigne. (**A two-year study of "flavescence dorée", a new and serious disease of vines.**) [English, Russian and German summaries ¼ p. each.]
Ann. Amél. Plantes, 1957, **7**: 359-93, bibl. 12, illus.

The disease is spreading in south-west France. The main symptoms are brittle, yellow leaves and rubbery wood, apparently due to phloem necrosis. The cause is unknown, but transmission by grafting suggests a virus.

1259. Ochs, G.
Untersuchungen über die Verbreitung der Rebenviren durch Vektoren. (**Studies on the transmission of vine viruses by vectors.**)
Naturwissenschaften, 1958, **45**: 193, from abstr. in *Z. PflKrankh.*, 1958, **65**: 679-80.

Eriophyes vitis and *Phylloxera vastatrix* were found to be natural vectors of panachure of vines. Larvae of *Otiorrhynchus sulcatus* are also soil vectors. *Doralis fabae*, *Myzus persicae* and several nematode species are also discussed as possible vectors.

Bacteria.

(*See also* 2018h.)

1260. Ark, P. A.
Control of fireblight of pear with Agri-mycin formulations.
Plant Dis. Reptr, 1958, **42**: 1397-8, bibl. 3.

Agri-mycin 100 and Agri-mycin 500 applied as dusts or sprays gave reasonable protection against fire-blight (*Erwinia amylovora*) when applied every 4 or 5 days during the critical period starting with 10% bloom. Applications of sprays seemed to give a better, more persistent effect than the same number of dust applications.—Univ. Calif., Berkeley.

1261. Deep, I. W.
Crown gall chemotherapy with Terramycin.
Plant Dis. Reptr, 1958, **42**: 1210-13, bibl. 6.

Incipient crown gall infections were eliminated from 1-year-old mazzard cherry seedlings by treatment with Terramycin at 400 p.p.m. for 30 minutes. Terramycin at 800 p.p.m. for 15 minutes effectively prevented infection when the trees were planted in infected soil. Neither of these treatments was phytotoxic, though damage has been reported from other trials. Nurserymen in Oregon are now advised to soak mazzard cherry rootstocks in 200 p.p.m. of Terramycin for 30 min. before planting. [For earlier work see *H.A.*, 28: 2344.]—Oregon agric. Exp. Stat., Corvallis.

1262. Cole, J. R.
Preliminary results from antibiotic treatments of pecan nursery tree roots for control of crown gall (*Agrobacterium tumefaciens*).
Plant Dis. Reptr, 1959, **43**: 81.

One year's results from dipping young pecan tree roots in a 400 p.p.m. solution of Terramycin for 1 hour indicate that some control of crown gall infection was obtained. Further tests are in progress.—U.S.D.A., Albany, Ga.

Fungi.

(*See also* 1323k-p, t, v, y, 1324c, d.)

1263. Průšová, H., and Zemánek, J.
Výsledky pokusů s organickými fungicidy proti strupovitosti jabloní. (**Results of experiments with organic fungicides against apple scab.**) [Russian and German summaries ½ p. each.],
Věd. Práce výzk. Úst. rostl. Výroby ČSAZV, 1958, **4**: 105-31, bibl. 23, illus.

Work is reported on scab, *Venturia inaequalis*, control during 1953–1956 in several places. In 1953 dichlone (2,3-dichloro-1,4-naphthoquinone) was the most effective fungicide on both fruit and leaves, followed by marbam. Ziram, while giving good protection of fruit, was unsatisfactory for the leaves. Kuprikol came second on leaves and fourth on fruit. All concentrations were 0·5% except Kuprikol in post-blossom spray which was 0·3%. In 1954 zineb and ziram were not so good on leaves but as satisfactory on fruit as Kuprikol or a spray schedule of Kuprikol-Sulikol. The sole experiment in 1955 confirmed that the carbamates gave less control on the leaves than on the fruit. At 1% zineb (50% active ingredient) and ziram (27·5% a.i.) gave 94·1% and 98·4% control, respectively, on the fruit of the variety Ontario. In 1956 in semi-commercial trials Novozir L (ziram) at 1% gave 90% control on fruit at Ruzine, but elsewhere, under conditions very favourable for disease development, only 50%. The organic fungicides did not appear to be phytotoxic; on the contrary the two dithiocarbamates had a favourable effect on the general condition of the trees. [For similar work on downy mildew of vine see *H.A.*, 29: 272.]

1264. Kosswig, W.
Studies on the overwintering of powdery mildew, *Podosphaera leucotricha* (Ell. et Ev.) Salm.
Höfchen-Briefe, 1958, **11**: 14-24, bibl. 6, illus.

Studies on the leader shoots of Jonathan apples indicated that the crucial period for fungicide application is May/June so that conidia formation may be prevented. For mechanical control removal of the terminal bud and the first axillary buds is sufficient.—Inst. Phytopath., Bonn Univ.

1265. Sprague, R.
Phytoactin shows activity against *Podosphaera leucotricha.*
Plant Dis. Reptr, 1958, **42**: 1208-9, bibl. 1.

Phytoactin applied in greenhouse tests to pear seedlings at 100 p.p.m. and in an outdoor trial to apples at 200 p.p.m. gave very promising control of mildew. [See also *H.A.*, 28: 406.]—Wash. agric. Exp. Stat., Pullman.

1266. ten Houten, J. G.
Resistance trials against collar rot of apples caused by *Phytophthora cactorum*.
Tijdschr. PlZiekt., 1958, **64**: 422-31, bibl. 14, illus.

Artificial inoculation of apple trees with *Phytophthora cactorum* was most successful using a cork borer technique, June being the optimum time for inoculation. Rootstocks had little effect on scion susceptibility, except that trees on seedling stocks appeared to be more susceptible than those on M.IV and M.VII. In field trials 80 apple varieties and 8 Malling stocks were inoculated. James Grieve, Wealthy, Dubbele Zoete Aagt and Dubbele Bellefleur were among the most resistant varieties, whereas Transparente de Croncels, Sterappel, Red McIntosh, Neerland's Glorie, Reinette van Ekenstein, Sans Pareil, Freiherr von Berlepsch and Cox were among the most susceptible varieties. M.IX appeared to be the most resistant stock and M.IV and M.VII were also very resistant. M.XIII and M.XVI were very susceptible. Dubbele Zoete Aagt and Dubbele Bellefleur are recommended as interstocks for Cox [see also *H.A.*, 28: 2364].—Inst. PlZiekt. Onderz., Wageningen.

1267. Sewell, G. W. F., and Wilson, J. F.
Resistance trials of some apple rootstock varieties to *Phytophthora cactorum* (L. & C.) Schroet.
J. hort. Sci., 1959, **34**: 51-8, bibl. 27, illus.

A number of rootstocks of the Malling, Malling-Merton and M.IX Crosses series were each inoculated with several isolates of *P. cactorum*, the causal organism of collar rot and crown rot. All rootstock varieties were susceptible to attack by this soil-borne pathogen, but all showed greater resistance than Cox's Orange Pippin. There were marked differences in the rootstock resistances and the pathogenicities of different isolates. M.XII, M.XIII, M.XVI, M.26 (3436), MM.103, MM.107, MM.110, MM.115, MM.113, and 3438 were considered to be of relatively low resistance and M.I, Crab C and MM.112 of intermediate resistance. All other rootstocks were of high resistance comparable to that of M.II; these include the 5 rootstocks (MM.104, MM.106, MM.109, MM.111 and M.XXV) which have recently been released to propagators in Britain. [Authors' summary.]—E. Malling Res. Stat., Kent.

1268. Pierson, C. F.
Forecasting bull's-eye rots in northwest-grown apples in storage.
Plant Dis. Reptr, 1958, **42**: 1394-6, bibl. 6.

Storage of sample lots of apples at 60°–70° F. shortened the incubation period of bull's-eye rots (*Neofabraea perennans* and *Phialophora malorum*), thus allowing a forecast to be made of their incidence in the main, cold-stored lot. In both years of the study the apples could thus be marketed before disease symptoms appeared.—Agric. Mktg Serv., U.S.D.A.

1269. Blumer, S.
Der Zwetschgenrost. (**Plum rust.**)
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 26-30, bibl. 2, illus.

Fifty-six plum and damson varieties are listed according to their susceptibility to *Tranzschelia pruni spinosae*. Zineb is recommended for control where the severity of the disease warrants the treatment and where no zineb-shy varieties are grown. [See also *H.A.*, 23: 1693.]

1270. Alghisi, P., and Dal Pozzo, C.
Sulla possibilità di effettuare la lotta invernale contro la bolla del pesco (*Taphrina deformans*) a mezzo di prodotti a base di ziram. (**The possibility of controlling peach leaf curl (*Taphrina deformans*) in winter by ziram products.**)
Agric. Venezie, 1958, **12**: 569-80, bibl. 14, illus.

Peach trees of the variety Bonfiglioli di Romagna were treated with copper oxychloride (containing 50% of Cu) at 0·8%, or with a ziram product (containing 76% of the active principle) at either 0·7% or 0·4%, applying 2 l. of solution per tree in early December and 1·5 l. in early February. In the untreated controls the percentage of completely healthy leaves in May was 29, and in all 3 groups of treated trees it was over 99.

1271. Spurling, M. B.
Black heart of apricots.
J. Dep. Agric. S. Aust., 1958, **62**: 80-1, illus.

This disease, caused by *Verticillium* sp., may be recognized by a black ring in the cross section of the lateral limbs and partial defoliation. Contributory factors are waterlogging and intercropping with susceptible plants such as tomatoes and potatoes. Prior to replanting the soil should be sterilized with Vapam.

1272. Dement'eva, M. I.
The biochemical and physiological factors of resistance in gooseberry to mildew (*Sphaerotheca mors-uvae*). [Russian, with English summary ¼ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 5, pp. 149-60, bibl. 23.

Resistant gooseberry varieties, compared with susceptible, were found to have lower activity of catalase, higher activity of peroxidase, lower sugar and higher organic acid contents, slightly lower pH in leaves of the same age, narrower stomatal openings and lower transpiration rates, and thicker cuticle on leaves, shoots and berries.

1273. van Adrichem, M. C. J., and Orchard, W. R.
Verticillium wilt resistance in the progenies of *Fragaria chiloensis* from Chile.
Plant Dis. Reptr, 1958, **42**: 1391-3, bibl. 7.

From the results of tests for resistance to *Verticillium albo-atrum*, it is suggested that resistance in certain cultivated varieties may have been introduced through *Fragaria chiloensis* from North and South America, and that by selfing certain cultivated varieties resistant lines may be isolated. [See also *H.A.*, 28: 2253.]—Canada Dep. Agric., Ottawa, Ont.

1274. op't Hoog, G. T.
Bladvalziekten in zwarte bessen. (**Leaf fall of black currants.**)
Groent. Fruit, 1958, **14**: 459, from abstr. in *Beerenobstschrift.*, 1958, No. 13, p. 12.

Black currant bushes sprayed 3 times with zineb were still in full leaf by the end of September. Results with captan were little different from the untreated control. Spraying should be started soon after flowering.

1275. Taylor, J.
Stem canker and related blueberry diseases.
Tech. Bull. N.C. agric. Exp. Stat. **132,** 1958, pp. 24, bibl. 26, illus.

This bulletin is mainly a mycological study of *Botryosphaeria corticis*. No economically effective chemical control has been found for stem canker, although ferbam and maneb will control most leaf diseases and some other stem diseases of blueberries.

1276. Zuckerman, B. M.
Relative importance of cranberry rot fungi during the storage and harvest seasons in Massachusetts, 1956-1957.
Plant Dis. Reptr, 1958, **42**: 1214-21, bibl. 5.

Current findings were compared with earlier data from 1916–17 and 1926–29. *Glomerella cingulata vaccinii* was, as in the past, the most important rot organism. *Sporonema oxycocci* has become more abundant than before, and the relative importance of several other organisms has also changed. Altering the time of flowering through "late water" and "early water" holding management practices did not significantly affect the quality of the berries, nor did they consistently influence the specific rot fungi found at harvest. Cranberry rots could not be distinguished without resorting to artificial cultures.—Cranberry Exp. Stat., Univ. Mass., East Wareham.

1277. Pucci, E.
L'antracnosi della vite. (**Anthracnose of vines.**)
Inf. fitopat., 1958, **8**: 364-6, illus.

The treatment recommended against anthracnose (*Sphaceloma ampelinum*) is the application, just before bud burst, of a mixture of 30–35 kg. of ferrous sulphate, 2 l. of sulphuric acid (53 Baumé) and sufficient water to make a total of 100 l. In addition, 1% bordeaux mixture can be used, if necessary, before and after flowering, particularly when the shoots have reached about 10 cm. long.

1278. Kišpatić, J.
Influence of copper fungicides and carbamates on vine development. [? Yugoslav.]
Kem. u Industr. Zagreb, 1958, **7** (4): A17-18, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-30.

Reports on the harmful effects of Cu fungicides were confirmed. Dithane was practically equal to bordeaux and copper oxychloride against *Peronospora* but had a much less adverse effect on growth.

1279. N.S.W. Department of Agriculture, Biological Branch.
Dead arm disease of grapes.
Agric. Gaz. N.S.W., 1958, **69**: 413-15, illus.

It is stated that more of the dead wood cut out of vines during annual pruning in N.S.W. may be due to *Phomopsis viticola* than most growers realize. Infected canes have been found on the varieties Waltham Cross, Grenache and, to a lesser degree, Black Muscat. Control experiments are in progress with captan and sodium arsenite. The standard thiram or ziram treatment against black spot does not control dead arm. J.R.L.

Nematodes.

1280. Baxter, P.
Why a sudden collapse in apple trees?
Vict. hort. Dig., 1958, **3** (3): 2-4, illus.
Fruit World, Melbourne, 1958, **59** (10): 23.

Sudden leaf wilting on one or more branches of apple trees was shown to be associated with root attack by nematodes and root borers. Control of the borer may be obtained by trapping the beetles on the trunks between September and November, and by spraying the trunk and surrounding soil with double strength DDT (0·2%). DDT (0·1%) should also be sprayed at budburst, petal fall, and 3 weeks after petal fall. Increased fertilization will help tree recovery.

1281. Clayton, C. N.
With fumigation you can grow peaches after peaches.
Res. and Fmg N.C., 1958, **17** (2): 12, illus.

Fumigation of old peach orchard soil with DD (50 gal. per acre) or ethylene dibromide (12 gal. Dowfume W-85 per acre) to destroy root-knot nematodes has resulted in growth of new trees equal to that of trees in new soil. Fumigation of the whole field was better than strip fumigation.

1282. Davidson, J. H., and Dieter, C. E.
Soil fumigation aids tree growth.
Amer. Nurserym., 1958, **108** (5): 14-15, 60-3, illus.

Spring fumigation with Dowfume W-85 at 9 or 12 gal./acre before planting mahaleb stock reduced populations of root lesion nematodes (*Pratylenchus* sp.) and improved the growth of budded trees in comparison with those on untreated areas. There was some reduction in stand after spring fumigation, but this did not occur after autumn fumigation.

1283. Lindhardt, K., and Thuesen, A.
Fortsatte undersøgelser over varmtvandsbehandling mod jordbaerål (*Aphelenchoides* spp.). (**Further studies on the control of strawberry eelworm.**) [English summary 1¼ p.]
Tidsskr. Planteavl, 1958, **62**: 483-98, bibl. 8, illus.

Strawberry plants of the Dybdahl and Ydun varieties, which were hot water-treated, yielded 2–31% and 2–16% more, respectively, that the controls over a period of 3 years. In other trials eelworm-free Dybdahl mother plants yielded 40% more than plants from uninspected and random areas over 2 years. Not all plants were found to stand the treatment equally well, and it is assumed that firm plants and those with a high percentage of dry matter tolerate the hot water best. When the treatment was carried out in January and in conjunction with cold storage, three-quarters of the plants survived 49° C. for 7 minutes and about one-half survived 50° or 52° C. for 10 minutes. Plants dug and treated in March did not tolerate more than 46·2° C. for 10 minutes. Reinfection of strawberries sometimes occurred where eelworms had been present in previous years, weeds acting as sources of infection. There is also evidence that *Aphelenchoides fragariae* can survive in the soil in the absence of host plants, though the chance of infection is small. The propagation of eelworm-free strawberry plants has been established in Denmark on a commercial basis. [See also *H.A.*, 25: 356.]—Spangsbjerg Res. Stat.

Mites.

(*See also* 1324e.)

1284. Post, A.
Invloed van cultuurmaatregelen op de dierlijke levensgemeenschap in boomgaarden. (**The effect of cultural practices on the fauna in the orchard.**) [English summary 16 lines.]
Meded. Dir. Tuinb., 1958, **21**: 612-21, bibl. 14, illus.

Both mite and insect populations are generally higher on apple trees kept in good growth by manuring and pruning. Laboratory studies showed that *Panonychus ulmi* feeding on leaves containing 167 mg. N per 100 g. dry weight had a higher reproductive capacity and lower egg mortality than mites feeding on leaves containing 113 mg. N per 100 g. dry weight. The problems of biological control methods in the orchard are discussed.—Proefst. Fruit. Volle Grond, Wilhelminadorp.

1285. Collyer, E., and Kirby, A. H. M.
Further studies on the influence of fungicide sprays on the balance of phytophagous and predacious mites on apple in south-east England.
J. hort. Sci., 1959, **34**: 39-50, bibl. 12.

Fungicide schedules based on lime-sulphur or captan have been applied to large plots of Cox's Orange Pippin trees for five consecutive seasons; a mixed schedule, of lime-sulphur pre-blossom and captan post-blossom, was also used in the middle three years. Insecticides were restricted during this period to nicotine and lead arsenate, and to bud-burst applications of DDT in the second and fourth years. In the first year, numbers of *Metatetranychus ulmi* (Koch) remained below one per leaf. In all subsequent years, numbers on plots receiving lime-sulphur, even pre-blossom only, exceeded this level, causing bronzing in 1955. On plots which received captan only, numbers remained substantially lower, seldom exceeding one per leaf. The predacious mite, *Typhlodromus tiliae* Oudms., was always more plentiful on captan-only trees. In the third and fourth years numbers on the mixed-schedule were, if anything, lower than on lime-sulphur-only plots. These densities showed a marked inverse correlation with those of *M. ulmi*; on lime-sulphur plots (but never on captan plots), the ratio frequently exceeded ten *M. ulmi* to one *T. tiliae*, i.e. exceeded the controlling capacity of the predacious mite. One or more species of predacious insects were abundant in all seasons. Of these, *Anthocoris* spp. and *Orius majusculus* (Reut.) alternated seasonally and within seasons. The black-kneed capsid, *Blepharidopterus angulatus* (Fall.) increased each year; densities were similar on lime-sulphur and on captan plots, except in the fourth year, but tended to be lower on plots where the mixed schedule was used.

Other predacious mirids, abundant at the start of the experiment, became negligible by the fourth year, being adversely affected by lime-sulphur and DDT. Neither the numbers of total insect predators nor of individual species showed any consistent correlation with *M. ulmi* numbers for any treatment, although such a correlation could have been obscured in this trial by the presence of a number of prey species besides *M. ulmi*. The inverse correlation between *M. ulmi* and *Typhlodromus* numbers has been consistent in this and a previous trial by the present authors [see *H.A.*, 25: 2669], lending support to the idea, although not providing proof, that *Typhlodromus* mites are an important factor in the biological control of *M. ulmi* in south-east England. Whereas the use of captan as a fungicide allowed natural control of *M. ulmi* at an economic level, the use of lime-sulphur resulted in the gradual development of *M. ulmi* populations sufficient to cause bronzing of the foliage in the fourth year. [Authors' summary.]—E. Malling Res. Stat., Kent.

1286. Cleveland, M. L.
Field studies in the control of orchard mites in 1957.
J. econ. Ent., 1958, **51**: 713-14, bibl. 2.

The effectiveness of early-season sprays against the European red mite (*Panonychus ulmi* (Koch)) and of summer sprays against both this mite and two-spotted spider mite (*Tetranychus telarius* (L.)) on apples was studied. An oil at the green-tip stage (26 March) or one to three applications from 19 April (bud-pink) to 20 May (second cover) of Tedion, Genite, Chlorbenside, demeton, Thimet, Ovex (both the standard and an experimental (Dow M-928) formulation), Chipman R-6199, schradan, or *p*-chlorophenyl benzene sulfonate (Fenson) were effective for at least 60 days after petal fall. A dormant oil-dinitrocresol spray was less effective. Single applications of Kelthane, Hercules AC-528, and Guthion early in July gave less than one mite per leaf, and of demeton, Thimet, Trithion, Aramite, Chipman R-6199, Chlorobenzilate and ethion (Nialate) less than four mites per leaf after 4 weeks. Ovex in both formulations was not effective so long as the other materials, but two applications of the standard formulation gave excellent control. None of the materials injured fruit or foliage. [Author's abstract.]—Agric. Res. Serv., U.S.D.A., Vincennes, Ind.

1287. Klumpar, J.
Přezkoušení biologické účinnosti některých akaricidů se zvláštním zřetelem k pCPBS (p-chlorfenylbenzen sulfonátu). **(The biological effectiveness of some acaricides with special reference to PCPBS (*p*-chlorophenylbenzene sulphonate).)** [Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 1141-52, bibl. 9.

Results are given of laboratory and field trials, on apple and cherry, conducted in Brno in 1957. A very good kill of winter eggs of mites (*Metatetranychus ulmi* and *Bryobia praetiosa*) was obtained with a combination of the γ-isomer of BHC (1·95%) and DNOC (0·24%). A further excellent ovicide was PCPBS (Czechoslovak manufacture) at 0·8% (0·2% active ingredient). For summer treatment against *M. ulmi* PCPBS at 0·8 and 0·5%, Erysit (a similar German product) 0·1%, Ekatin (Thiometone) 0·1% and Fosfotion (malathion) 0·2% were very satisfactory. The best of the S products was lime-sulphur 5%. The compound PCPBS was found to be a better ovicide than larvicide, with a penetrating but not spreading action. At ovicidal rates no direct effect on females was observed, but the eggs produced died within a few days.

1288. Fullmer, O. H., and Cassil, C. C.
Colorimetric microdetermination of the acaricide 2,4,5,4′-tetrachlorodiphenyl sulfone.
Cassil, C. C., and Fullmer, O. H.
Persistence of Tedion residues on fruit.
J. agric. Food Chem., 1958, **6**: 906-8, bibl. 5, and 908-10, bibl. 3.

The first paper describes a new method of determining Tedion residues. The authors' abstract on the second paper reads as follows: The compound 2,4,5,4′-tetrachlorodiphenyl sulfone is a very effective acaricide against several species of mites. Data are given showing the magnitude of Tedion spray surface residues found on apples, pears, peaches, lemons, and oranges. Time studies on these fruits indicate that Tedion residues diminish largely as a result of fruit growth and not by decomposition. Results illustrate the magnitude of Tedion residues which may be expected on apples, pears, peaches, plums and prunes when sprays are applied from 3 to 130 days before harvest time. Maximum residues found from sprays containing 1 lb. of Tedion 25% wettable powder per 100 gal. of water on these fruits varied from 1·3 to 3·6 p.p.m.—Niagara chem. Div., Food Machinery chem. Corp., Richmond, Calif.

Slugs.

(*See also* 1510, 1511.)

1289. van den Bruel, W. E., and Moens, R.
Remarques sur les facteurs écologiques influençant l'efficacité de la lutte contre les limaces. **(Observations on the ecological factors affecting the effectiveness of slug control measures.)**
Parasitica, 1958, **14**: 135-45.

Control measures should be carried out against *Agriolimax reticulatus* in summer, against *Arion hortensis* in April and in autumn, and against *Arion rufus* after hatching, about April. The slug population in a layer of soil 25 cm. deep was 73 per sq. m. after harvesting carrots, twice as high under withering bean plants, and 7 times as high under a heap of weeds.

Insect pests.

(*See also* 1168, 1200, 1323a, b, u, w, 1324h, 1840-1844, 2013, 2017.)

1290. Michelbacher, A. E., and Hitchcock, S.
Walnut aphid investigations in Northern California.
J. econ. Ent., 1958, **51**: 527-32, bibl. 12.

Walnut aphid (*Chromaphis juglandicola*) is most destructive to walnuts from the time the leaf buds begin to unfold until the leaves are fully expanded. Of the insecticides tested schradan was the most effective against this aphid. Except in a region where the aphid has shown resistance to certain phosphate insecticides, 0·5 lb./ac. of schradan has very satisfactorily controlled the pest for a whole year, and rates of 0·75 and 1 lb./ac. have given a still higher degree of protection. Although the material exerted a suppressing action on some sucking pests of walnut, others, such as the calico scale (*Lecanium cerasorum*) and the European red mite (*Panonychus ulmi*), tended to increase in number. There was evidence suggesting that schradan exerts a stimulating effect on walnut trees in addition to that resulting from the control of pests. —Univ. Calif., Berkeley.

1291. RAINE, J., AND ANDISON, H.
Life histories and control of cherry fruit flies on Vancouver Island, British Columbia.
J. econ. Ent., 1958, **51**: 592-5, bibl. 13.

A 6-year study showed that *Rhagoletis cingulata* (Loew) starts to emerge on Vancouver Island about mid-June, the peak occurring between 4 and 19 July and most of the flies being out by the third week of July, when picking is in progress. *Rhagoletis fausta* (O.S.) emerges 3 to 4 weeks after *R. cingulata* and does not become numerous. Lead arsenate gave satisfactory control but left an objectionable visible residue at harvest. Four sprays of 25% Diazinon emulsifiable liquid at 2 pt. per 100 Imp. gal., applied at 10-day intervals starting 15 June, gave the best control and appeared to be lethal to larvae within the fruit as well as to the adult flies. One week after the last spray Diazinon residues were within the U.S. and Canadian legal tolerance of 0·75 p.p.m. Emulsions of chlordane, methoxychlor, Perthane and malathion were not satisfactory. [From authors' abstract.]

1292. BARNES, M. M., AND ORTEGA, J. C.
Glycine-sodium hydroxide as an attractant for walnut husk fly.
J. econ. Ent., 1958, **51**: 532-4, bibl. 3.
BARNES, M. M., AND OSBORN, H. T.
Attractants for the walnut husk fly.
J. econ. Ent., 1958, **51**: 686-9, bibl. 13, illus.

The initial and continuing effectiveness of a sticky trap baited with powdered ammonium carbonate as an attractant for the walnut husk fly, *Rhagoletis completa*, was studied in comparison with that of a standard glycine-sodium hydroxide bait solution [see also *H.A.*, 28: 3538]. Among other ammonia-producing salts studied were diammonium azelate, which was only slightly less effective than ammonium carbonate. Among types of dry-trap baited with ammonium carbonate, a sticky trap consisting of a waxed and plastic-lined cardboard tube hung horizontally proved to be twice as effective as the standard sticky trap.—Univ. Calif. and Calif. St. Dep. Agric.

1293. BÖHM, H.
Zum Vorkommen der Mittelmeerfruchtfliege, *Ceratitis capitata* Wied., im Wiener Obstbaugebiet. (**On the incidence of the Mediterranean fruit fly in the fruit growing area around Vienna.**) [English summary 1½ p.]
PflSch. Ber. Wien, 1958, **21**: 129-59, bibl. 23, illus.

In extensive field and laboratory studies during 1952–1957 the Mediterranean fruit fly was shown to be an endemic pest of fruit in the Vienna area, developing two generations per year. Peaches and apricots are the main hosts, soft pear varieties are seldom and apples only rarely attacked. Under some conditions the damage caused is severe. Both mechanical and chemical methods of control were tested with indifferent success, with the exception of 4 weeks' cold storage of affected fruits at 0° C. which killed all stages of the pest. Among insecticides experimentally applied, chemicals containing DDT proved superior to others, but the results were still unsatisfactory.

1294. GUENNELON, G., AND FERON, M.
La receptivité des pêches aux attaques de *Ceratitis capitata* Wied. dans la Vallée du Rhône. (**Peach susceptibility to attack by Mediterranean fruit fly in the Rhône valley.**)
Ann. Épiphyt., 1958, **9**: 355-70, bibl. 4, illus.

Eggs laid on attached fruits 6 to 8 weeks before the start of harvesting are prevented from further development by fruit reaction (gummosis or lignification). Non-attached fruits did not react to oviposition, and therefore dropped fruit in the orchard can be a dangerous source of infection.

1295. CARLOTTI, G.
Prove di lotta contro il *Phyllocoptes fockeui*. (**Experiments on the control of *Phyllocoptes fockeui*.**)
Inf. fitopat., 1958, **8**: 344-5, illus.

The pest was satisfactorily controlled on peach trees by spraying with 0·2% colloidal sulphur. Kelthane at the same rate gave results almost as good. The persistence of Triton and of a mixture of Fenkapton+Isolan was insufficient, and Fostion gave poor results.

1296. CHANG, H.-T., CHOW, S.-L., AND WANG Y.-J.
A preliminary study on the codling moth in Sinkiang. [Chinese, with English summary 1 p.]
Acta ent. sin., 1958, **8**: 136-51, bibl. 4.

A discussion of the biology of the codling moth, lately found highly destructive in pear and apple orchards in Sinkiang, is followed by an account of control measures. It is noted that the egg parasite *Trichogramma* sp. is of considerable importance. Some success was achieved with DDT emulsion, active ingredient 0·2%, and with cloth banding impregnated with 15% DDT in fuel oil.

1297. MADSEN, H. F., AND HOYT, S. C.
Investigations with new insecticides for codling moth control.
J. econ. Ent., 1958, **51**: 422-4, bibl. 5.

During 1956 in 2 pear orchards in northern California, ryania, Sevin, and Guthion were the most effective of the newer materials tested against codling moth (*Carpocapsa pomonella*), giving a control comparable to the standard DDT treatment. In further trials on pears in 1957 Guthion and Sevin were again satisfactory, and, in addition, the former controlled European red mite (*Panonychus ulmi*) and both materials reduced a lepidopterous leaf miner (*Lithocolletis* sp.) infestation to a low level. Ryania, at a low rate plus a spreader-sticker, gave inadequate codling moth control. In an apple orchard codling moth showed resistance to DDT, but Trithion, ryania, Sevin and ethion provided satisfactory control of a heavy infestation. Trithion and ethion also controlled European red mite and Sevin prevented a build-up of apple aphid (*Aphis pomi*). The materials had no serious phytotoxic effects on either pears or apples.—Univ. Calif., Berkeley.

1298. HAMILTON, D. W., AND FAHEY, J. E.
Effect of insecticides on codling moth larvae seeking cocooning quarters.
J. econ. Ent., 1958, **51**: 672-3, bibl. 2, illus.

Tests were conducted to determine the value of spraying apple tree trunks and ground debris for the control of cocooning larvae of the codling moth (*Carpocapsa pomonella* (L.)). High percentages of the larvae were killed with parathion (15 w.p.), Guthion (15 w.p.) and Diazinon (25 w.p.) sprays at 2 pounds per 100 gallons. Sevin was less effective and endrin was ineffective. [Authors' abstract.]—Agric. Res. Serv., U.S.D.A., Vincennes, Ind.

1299. VASILIEV, V. P.
Measures of codling moth control in apple trees and other fruit trees in the USSR.
Proc. 9th int. Conf. Quar. Plant Prot., Moscow, 1958, 1958, pp. 13.

Three major pests of fruit trees in the U.S.S.R., codling moth (*Carpocapsa pomonella*), pear fruit moth (*Carpocapsa pyrivora*) and plum fruit moth (*Laspeyresia funebrana*) are discussed. Methods of forecasting the correct time for spraying against codling moth are examined, and DDT spray programmes for all 3 species are outlined.

1300. TADIĆ, M.
Izbor metode za odredjivanje rokova suzbijanja jabučnog smotavca (*Carpocapsa pomonella* L.). **(The choice of a method for determining the timing of control measures against codling moth.)** [French summary 1 p.]
Arh. poljopr. Nauk, 1958, **11** (33): 103-14, bibl. 9.

Of the 2 methods tested to determine codling moth emergence the use of an insectarium proved more accurate and simpler to organize than that of food traps. The timing of spray applications based on local flight observations is recommended.

1301. MONRO, H. A. U.
Suppression of oriental fruit moth in British Columbia.
Down to Earth, 1958, **13** (4): 16-20, bibl. 1, illus.
Eradication measures against the oriental fruit moth in the province of British Columbia, Canada.
FAO Plant Prot. Bull. 1958, **6**: 177-9.

Grapholitha molesta was introduced from the United States in a consignment of peaches in 1956. In 1957 a vigorous eradication campaign was undertaken including the fumigation of cannery buildings and orchards with methyl bromide. The first paper gives a more detailed account of the orchard fumigation. Larvae of *Tenebrioides mauritanicus* were used to test the efficacy of fumigation. The campaign, so far, appears to have been successful.

1302. ALLEN, H. W., AND PLASKET, E. L.
Populations of the oriental fruit moth in peach and apple orchards in the Eastern States.
Tech. Bull. U.S. Dep. Agric. **1182,** 1958, pp. 13, bibl. 8.

Data are presented on population densities of *Grapholitha molesta* before and after insecticidal control became available. In bearing orchards populations were much lower when adequate control measures were applied, but large populations are still found in young unsprayed peach orchards and in neglected apple orchards. In general unsprayed apple trees were the most prolific source of fruit moth larvae.

1303. ATKINS, E. L., Jr.
The garden tortrix, *Clepsis peritana* (Clemens): a new economic pest in southern California.
J. econ. Ent., 1958, **51**: 596-8, bibl. 2, illus.

The larvae of this moth feed primarily on decaying vegetable matter from which they move to sound citrus fruit and foliage, lima bean blossoms and leaf buds, and strawberry plants and fruit. Chemical treatments have been only slightly effective and not more satisfactory than cultural practices, which consist of picking citrus from the lower branches first, removing fallen leaves from under the trees, cutting off old strawberry leaves after harvest and burning all trash.—Univ. Calif., Riverside.

1304. Snapp, O. I.
Trunk sprays for control of the peach tree borer.
J. econ. Ent., 1958, **51**: 557-8, bibl. 2.

DDT, BHC and parathion trunk sprays were highly effective against light infestations of peach tree borer (*Sanninoidea exitiosa*) but were not dependable against moderate to heavy infestations. Ethylene dichloride emulsion poured around the bases of trees in October gave very good control regardless of the degree of infestation.—Ent. Res. Div., U.S.D.A.

1305. Madsen, H. F., and Sanborn, R. R.
Peach tree borer on apricots.
Calif. Agric., 1959, **13** (1): 10-11, illus.

Monthly and bi-monthly trunk treatments with Thiodan and endrin gave excellent control of the peach tree borer [*Sanninoidea exitiosa*]. Monthly applications of Guthion were more effective than bi-monthly treatments. Commercial control was obtained with DDT.

1306. Miles, H. W.
Dock sawfly, an occasional pest of apples.
Agriculture, Lond., 1958, **65**: 402-5, illus.

The life history and habits of *Ametastegia glabrata* are described. The pest occurs in plantations where dock, sorrel and plantain grow and these should be eliminated by forking out complete with their roots. Destruction in winter of the tops only, however, fails to kill the docks and causes a reduction in the number of hibernating parasites of the sawfly.

1307. Estación Experimental de Cinco Saltos, Rio Negro, Argentina.
Mancha rosada de la manzana. (**Rosy spot of apples.)**
Bol. Cent. reg. rioneg., 1958, **6** (2): 1-4.

Apples growing in the vicinity of poplar groves were attacked by larvae of the grey scale insect, *Quadraspidiotus ostraeformis*, which remained on the fruit only long enough to produce small punctures ringed with red. The brevity of the attack was attributed to recent treatment of the apple trees with an acaricide. Spraying the poplars would be very costly and difficult, therefore an extra treatment of the fruit shortly before harvesting is reluctantly proposed.

1308. Brenière, J.
Sur une cochenile nuisible à la vigne à Madagascar (*Hemiberlesia lataniae* Sign.). (**On a scale insect harmful to the vine in Madagascar, *Hemiberlesia lataniae*).**
Bull. Madagascar, 1957, **7**: 521-7.

The damage caused in various districts is described. Partial control has been obtained by spraying parathion. The parasites of the pest and the possibilities of biological control are discussed.

1309. Michelbacher, A. E., and Hitchcock, S.
Induced increase of soft scales on walnut.
J. econ. Ent., 1958, **51**: 427-31, bibl. 8.

In recent years a marked increase of soft scales in Californian walnut orchards has caused great concern. One of the basic reasons for the increase is that the principal natural enemies of the scales are very small hymenopterous parasites, which are adversely affected by small amounts of insecticide. The scales concerned are: frosted scale (*Lecanium pruinosum*), European fruit lecanium (*L. corni*) and calico scale (*L. cerasorum*). All 3 were most readily controlled during July and August by 2 lb. of 25% parathion w.p. plus $\frac{3}{4}$ gal. of light summer oil emulsion in 100 gal. per acre applied with an air carrier sprayer. During the dormant period, December–February, 5 lb. of 25% parathion w.p. plus 2 to 4 gal. of oil emulsion per acre, gave satisfactory control. [See also *H.A.*, 29: 302.]—Univ. Calif., Berkeley.

Other pests.

(*See also* 1323c, d, j, x, 1324f, g.)

1310. Becker, P., and Gilbert, E. G.
Selective bird damage on pears in winter.
J. roy. hort. Soc., 1958, **83**: 509-15, bibl. 1, illus.

Bullfinches at Wisley preferred dormant buds of Williams' and Laxton's Superb to those of Comice, which were hardly touched. From preliminary observations in the pear variety trial, damage to 136 varieties is listed as severe, moderate or slight.

1311. Festetics, A.
Biológiai végekezés a szőlőt károsító seregély ellen. (**Biological control of starlings damaging grapes.)**
Kert. Szől., 1956, No. 8, p. 22, from *Hung. agric. Rev.*, 1957, **6** (3), Abstr. 199.

Serious loss of grapes through the depredations of starlings was prevented by flighting trained predacious birds over vineyards, under the control of falconers. The most suitable birds were goshawk (*Accipiter gentilis*) and kestrel (*Falco tinnunculus*).

1312. Brewster, R. H.
What's new in rabbit repellents?
Amer. Nurserym., 1958, **108** (9): 13, 45.

The use of trinitrobenzene aniline, ZAC and several formulations of thiram plus sticking agents is discussed. A short list of ornamental and other plants indicating their susceptibility to rabbit damage is included.

Sprays and spray residues.

(*See also* 1071, 1210, 1324a.)

1313. Wood, F. A.
Observations on the effects of copper fungicides on strawberry foliage in central New Brunswick.
Canad. J. Plant Sci., 1958, **38**: 477-80, bibl. 3.

A severe reddening of Senator Dunlap strawberry leaves, due to premature formation of anthocyanin, has consistently occurred after application of Cu fungicides in June or later. Experiments showed that anthocyanin formation was accelerated by successively later applications of Cu fungicides. Anthocyanin did not increase any more rapidly in foliage treated with non-copper fungicides than in untreated foliage. [From author's abstract.]—Canada Dep. Agric., Fredericton, New Brunswick.

1314. Newhall, A. G., and Gunkel, W. W.
Efficient incorporation of granular fungicides and other chemicals in the root zone of cultivated soils.
Plant Dis. Reptr, 1959, **43**: 111-14, bibl. 1, illus.

The mixing abilities of several tillage implements (spike tooth harrow, disc, rotary tiller with spikes and with knives) were compared on a sandy soil. The best results were obtained using rotary tools with L-shaped blades.—Cornell Univ., Ithaca.

1315. Somers, E.
The preparation of bordeaux mixture.
J. Sci. Food Agric., 1959, **10**: 68-72, bibl. 12.

Using seven different methods of preparation, the sedimentation, tenacity, *in vitro* fungitoxicity, and rate of crystallization of 8: 10: 100 bordeaux mixture have been investigated. It is suggested that the most effective bordeaux mixture is that prepared by adding a concentrated lime paste to diluted copper sulphate. [Author's summary.]—Agric. hort. Res. Stat., Long Ashton.

1316. Rui, D., and Cosolo, S.
Prove di confronto tra irroratrici a basso e ad alto volume. (**Comparative tests with low- and high-volume spray equipment.**)
Frutticoltura, 1958, **20**: 673-7, illus.

Various fungicides were applied in vineyards by means of ordinary spraying equipment and a low-volume atomizer. No very definite conclusions were drawn, but the following indications were noted. The low-volume apparatus would have saved time, had it been constructed with more than one tube and nozzle. It saved approximately 64% of water in one test and 83% in another, and functioned perfectly with high concentrations (e.g. over 5% of copper sulphate). The variation between actual output and that registered, while appreciable for small plots, would be negligible in practice. In almost every case there was considerable saving of fungicide with this low-volume apparatus. The protective effects of the treatments could not be effectively compared, because during that season the incidence of downy mildew was only slight.

1317. Courshee, R. J., and Valentine, R. W.
Use of plaster of Paris for recording spray drops. [French, German and Spanish summaries 10 lines each.]
J. agric. Engng Res., 1959, **4**: 62-5, bibl. 6.

The smooth surface of a cast made from 1 part by weight of water to 2 parts of calcium sulphate hemihydrate is suitable for recording the arrival of drops ranging from 30 to 1,000 μ in diameter. The spread factor of water dyed with 1% of Nigrosine G 140 is constant at 3·8±0·1, and an observation error of 7μ would occur through the whole range.

1318. Russo, G.
I prodotti antiparassitari di sintesi nella lotta contro i parassiti animali in orto-floro-frutticoltura, in Italia, e l'unificazione dei limiti di tolleranza dei residui nei prodotti vegetali. (**Synthetic plant-protection products for control of pests in vegetable, flower and fruit crops in Italy, and standardization of permissible limits for residues on plant products.**) [English summary 8 lines.]
Ann. Sper. agrar., 1958, **12** (4), Suppl. pp. V-VII.

The uses of DNOC against scale insects and the winter eggs of mites and aphids are mentioned, also pests most susceptible to the chlorinated hydrocarbons and the phosphoric compounds. Nematicidal soil fumigants have proved ineffective in controlling endophytic nematodes without crop injury, and many non-phytotoxic nematicides have failed to control even *Heterodera* spp. Determination of residues is at present more accurately carried out by biological than by chemical methods, but standardization of reliable chemical methods is desirable.

1319. Staub, A.
Wie wirken Weissöle im Vergleich zu den neueren Winterspritzmitteln? (**How do white oils act in comparison with the more recent winter sprays?**)
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 86-9, bibl. 2.

Comparisons of white oil with certain phosphoric acid esters led to the continued recommendation of the former for the control of most fruit pests in Switzerland where non-toxic residues are desired. An exception is the green apple aphid, populations of which are not kept sufficiently low by white oil, especially in nurseries or young orchards. Fruit trees sprayed against San José scale with white oil were found to show little infestation of any pest in the following spring.

1320. WILDBOLZ, T., AND VOGEL, W.
Ueber den Einfluss von intensiver und schonender Insektizidspritzung in Apfelanlagen. **(On the effect of intensive and reduced insecticide applications on apple orchards.)**
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 78-86, bibl. 5.

Several years' trials showed that, in well cared for apple orchards, pre-blossom insecticide applications may be omitted without affecting fruit yields. Vigorous trees tolerate heavy populations of the aphid *Rhopalosiphum insertum*, but more serious infestations of winter moth (*Operophtera brumata*) never fail to cause damage, the extent of which depends on variety. In none of the trials were post-blossom insecticides shown to be worth while. Reduced spraying against codling moth was only possible where a close check was kept. The nature of the insecticide application, intensive or reduced, had little effect on the oviposition of *Rhopalosiphum insertum* in the following year, but the oviposition of the apple sucker (*Psylla mali*) was reduced by earlier anti-codling moth sprays. Populations of winter moth were kept low throughout the year by efficient control measures in the spring. Infestations of red spider mite were not sufficiently heavy for any conclusions to be drawn.

1321. HARVEY, H. E.
Determination of diphenylamine residues on apples.
N.Z. J. Sci., 1958, **1**: 378-82, bibl. 13.

A method for the determination of diphenylamine residues on apples is based on the colorimetric determination of the blue oxidation product produced with vanadium pentoxide in sulphuric acid. Beer's law is obeyed over the range 10 to 80 μg. [Author's summary.]—D.S.I.R., Wellington.

1322. ZEUMER, H., AND NEUHAUS, K.
Arbeiten über Rückstände von Pflanzenschutzmitteln auf oder in Erntegut. I Vorwort. II. Rückstände von Pflanzenschutzmitteln nach dem vorschriftsmässigen Einsatz von DDT gegen Obstmade. **(Papers on residues of plant-protective chemicals on or in the crop harvested. I. Introduction. II. Residues of DDT after application against codling moth.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 17-22, bibl. 2.

In the apples studied the amount of DDT residue varied between 0 (=<0·05 p.p.m.) and 0·9 p.p.m. in accordance with the variety and the time of the last application, which varied between 7 and 14 weeks before picking. The DDT content rose with the number of treatments, and this, together with varietal effect, masked the differences due to the time that elapsed between treatment and harvest and to the locality. The DDT was applied with various fungicides, but the kind of fungicide used had no effect on the level of DDT residue. DDT residues were found exclusively on the outside of the skin, no DDT being present in the skin or just under the skin or in the interior of the fruit.—Biol. Bundesanst. Land-u. Forstwirtsch. Braunschweig and Berlin-Dahlem.

Noted.

1323.
a BACCETTI, B.
L'energia nucleare contro gli insetti nocivi. **(Nuclear energy against insect pests.)**
Ital. agric., 1958, **95**: 713-17, bibl. 15.
A review.

b BOULANGER, L. W.
Tests on control of the codling moth in Maine during 1957.
J. econ. Ent., 1958, **51**: 542, bibl. 2.
Best control on apple was with Sevin and a lead arsenate-malathion combination.

c BRAMBELL, F. W. R.
Voles and field mice.
Leafl. For. Commiss. **44,** 1958, pp. 11, bibl. 5, illus., 1s.
Appearance, habits, economic damage and control.

d (CLOUTIER, A.)
Destruction of field mice in orchards.
Macdonald Fm J., 1958, **19** (4): 12, illus.
Preparation of strychnine, red squill and zinc phosphate baits.

e EISEL, H.
Untersuchungen über die Frostschutzberegnung. **(Studies on sprinkler irrigation for frost protection.)**
Weinberg u. Keller, 1958, **5**: 120-7, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. pp. 65-6.
The minimum sprinkler performance necessary for frost protection.

f ENGEL, H.
Erfahrungen mit dem Hubschrauber bei der Kirschfruchtfliegenbekämpfung im Streuobstbau. **(Observations on the control of cherry fruit fly in scattered trees by means of a helicopter.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 178-81, illus.
Effective and economic spraying with DDT emulsion in four areas.

g FRAZIER, N. W., AND POSNETTE, A. F.
Relationships of the strawberry viruses of England and California.
Hilgardia, 1958, **27**: 455-513, bibl. 52, illus.

h Geard, I. D.
The rôle of therapy in the control of plant diseases.
J. Aust. Inst. agric. Sci., 1958, **24**: 312-18, bibl. 28.
A review.

i Gorin, T. I.
Water regime and frost resistance in fruit trees. [Russian.]
Sad i Ogorod, 1958, No. 10, pp. 36-8.
Observations on apples indicating that inadequate water supply during dormancy leads to diminished frost resistance.

j Gosselin, H.
La protection des fruits contre les guêpes et les oiseaux. **(Protecting fruit against wasps and birds.)**
Rev. hort. Algér., 1958, Vol. **62**, No. 8/9, Suppl. *Jardins de Nos Provinces*, No. 8, pp. 4.
Notes on simple control measures.

k Heyns, A. J.
Fungicide tests—2. Apple scab, Grabouw (White Winter Pearmain).
Dec. Fruit Gr, 1958, **8**: 194.
Cyanamid compounds 5223 (70%), 18673 (70%) and 23441 (70%), and Thiram 80 recommended for further trial.

l Heyns, A. J.
Fungicide tests—3. Control of pear scab (Packham's Triumph) at Bien Donné, Groot Drakenstein.
Dec. Fruit Gr, 1958, **8**: 194-5.
Cyanamid 18673 (2 lb. per 100 gal.) gave the best control.

m Heyns, A. J., and Erasmus, S.
Fungicide tests—4. Control of apple scab at Waboomskraal, Joubertina (White Winter Pearmain).
Dec. Fruit Gr, 1958, **8**: 219.
Cyanamid 5223, Fuklasin (Ziram 90) and Polyram (Thiuram 87) were less phytotoxic than captan.

n Heyns, A. J.
Fungicide tests—5. Control of pear scab (on Winter Nelis) at Simondium.
Dec. Fruit Gr, 1958, **8**: 286.
Promising control was obtained by Coppercote W (16% Cu) and by Cyanamid 18673 (70%).

o Heyns, A. J.
Fungicide tests—6. Control of apple scab at Nuweplaas, Joubertina.
Dec. Fruit Gr, 1958, **8**: 292.
Cyanamid formulations or Kolofog 30 plus zineb 65 as effective as captan when they were applied post-blossom in addition to captan-diclone pre-blossom. Complete diclone+Fuklasin programme also satisfactory.

p Hughes, H. M.
The materials and means for strawberry disease control.
Comm. Gr, 1958, No. 3282, pp. 1092-3, illus.
Apparatus used at Efford Experimental Station for *Botrytis* control.

q Jenny, J.
Quelques données techniques sur les méthodes de lutte contre le gel. **(Some technical data on methods of frost control.)**
Landw. Jb. Schweiz., 1958, **7**: 557-74, bibl. 24, illus.
A review.

r Klemm, M.
Meldedienst, Prognose und Warndienst im Pflanzenschutz. **(Notification, prognosis and warning service in plant protection.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 1-9.
Several pests and diseases of horticultural crops are included in this general discussion.

s Koch, L. W., and others.
Rootrot and related literature. An annotated bibliography, 1957.
Plant Dis. Reptr, 1958, Suppl. No. 252, pp. 83-158, bibl. 543.
With a senior author index; includes all types of pathogen and also nematodes and various toxins.

t Loewel, E. L., and Labus, S.
Die Empfindlichkeit der wichtigsten Sorten der Schwarzen Johannisbeere für den Säulenrost. **(The susceptibility of the more important black currant varieties to *Cronartium ribicola*)**
Mitt. ObstVersuchsringes Jork, 1958, **13**: 258-60.
Three groups of varieties; zineb gave good control.

u Mackauer, M.
Zur Kenntnis der paläarktischen *Aphidiinae* (Hym., Braconidae) I. Beitrag: Die wirtschaftliche Bedeutung von *Aphidius ribis* Hal. **(A contribution to our knowledge of palaearctic Aphidiinae. I. The economic importance of *Aphidius ribis*.)** [English summary 9 lines.]
Z. angew. Ent., 1958, **43**: 282-5, bibl. 7.
Aphidius ribis was shown to restrict the population of *Cryptomyzus* (*Capitophorus*) *ribis* on red currants, but only to a limited extent.

v Martinov, S. I.
Grey mould of grapes. [Bulgarian.]
Lozarstvo i Vinarstvo, 1956, **5** (4): 212-14, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 16,029.
Fumigation with SO_2 at 40–60 g./cu.m. controlled *Botrytis cinerea* on stored grapes.

w Ministry of Agriculture, London.
Specifications and methods of analysis for certain pesticides.
Tech. Bull. Minist. Agric., Lond., **1**, 3rd edition 1958, pp. 126, 7s.

x Myllymäki, A.
Myyräntorjunnasta. (**Control of voles.**) [English summary 5 lines.]
Puutarha, 1958, **61**: 430-2, illus.
Endrin or toxaphene recommended.

y Rajkov, E. B.
Anthracnose of vines. [Bulgarian.]
Lozarstvo i Vinarstvo, 1956, **5** (4): 210-12, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 16,031.
For spring treatment 3–4 applications of 1–2% bordeaux are recommended, and, in the autumn after leaf fall, 30% iron sulphate plus 2% sulphuric acid.

z Schulz, F.
Über Kälteschäden an Stachelbeersträuchern. (**On cold injuries to gooseberry bushes.**)
Obstbau, 1956, **75**: 191, from abstr. in *Gartenbauwiss.*, 1958, **23** (2), Suppl. p. 48.
The effects of terrain and of varietal differences in hardiness.

1324.

a Stobwasser, H.
Untersuchung über quantitative Bestimmungsverfahren kleiner Mengen von Pflanzenschutzwirkstoffen nach ihrer Ausbringung besonders in Aerosolform. (**Investigation on quantitative methods of analysing small amounts of plant protective chemicals after their discharge, especially in the form of aerosols.**) [English summary $\frac{1}{2}$ p.]
Z. PflKrankh., 1959, **66**: 1-15.

b Thomas, H. E., and Nyland, G.
Gumboil disease of apricot.
Plant Dis. Reptr, 1959, **43**: 106-8, illus.
The symptoms are rough, cracked bark and discrete swellings with gum pockets beneath. It is possibly of genetic origin.

c Valenzuela, J. L.
Mancha en la hoja o viruela de las freseras, causada por *Mycosphaerella fragariae* (Schw) Lindau. (**Leaf spot of strawberry plants caused by *Mycosphaerella fragariae*.**)
Suelo Tico, 1958, **10**: 113-18, bibl. 10, illus.
Including brief notes on control by cultural practices and bordeaux mixture.

d Verderevskij, D. D., and Najdenova, I. N.
The nature of the resistance of vines to downy mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (8): 24-8, bibl. 2, illus.
Due mainly to phytoncidal characteristics.

e Woodhead, C. E.
A survey of the red mite problem in apple orchards.
Orchard. N.Z., 1958, **31**: 319-23.
Including spray recommendations.

f Wright, E. N.
Notes on the control of bullfinches.
Kent Fmr, 1958, **7**: 479-83.
By shooting and trapping.

g Wright, E. N.
Get those bullfinches with gun and trap.
Grower, 1958, **50**: 1143, illus.
Including description of Chardonneret trap.

h Zweig, G., and Archer, T. E.
Residue determination of Sevin (1-naphthyl N-methylcarbamate) in wine by cholinesterase inhibition and paper chromatography.
J. agric. Food Chem., 1958, **6**: 910-13, bibl. 10.
Following application to vines to control grape leaf folder [*Desmia funeralis*].

WEEDS AND WEED CONTROL.

General.

(*See also* 1063, 1071, 1556, 1985.)

1325. Lhoste, J.
Les désherbants chimiques. (**Chemical herbicides.**)
Office de la Recherche Scientifique et Technique Outre-Mer, 20 rue Monsieur, Paris VII, 1958, $10\frac{1}{2} \times 8\frac{1}{2}$ in., pp. 84, cyclostyled.

Some 60 herbicides—inorganic substances, mineral oils and the more recent organic compounds—are described. Chemical and physical properties, toxicity, action, method of use and, in some cases, susceptible species are stated. There is a useful appendix listing the numerous herbicides manufactured in France stating their names and composition.

1326. Società Italiana di Fitoiatria.
Atti del primo convengo sui diserbanti chimici, Milano, 25 Gennaio 1958. (**Proceedings of the first conference on chemical herbicides, Milan, 25 January 1958.**)
Not. Mal. Piante, 1958, No. 45/46, pp. 1-186, bibls, illus.

This issue of the journal is devoted entirely to weed control, including 18 papers and a discussion. Some of the papers have English summaries. Those of horticultural interest are abstracted separately.

1327. Anliker, W. L., and Morgan, M. J.
A technique for studying the relationship of herbicide spray characteristics to phytotoxicity.
Weeds, N. York, 1958, **6**: 447-53, bibl. 9, illus.

A technique for depositing equal quantities of spray with different nozzle sizes at various pressures is described. When young bean plants were sprayed with equal quantities of 2,4-D, using 3 nozzle sizes and 5 pressures ranging from 20–80 p.s.i., an increase in pressure was found to cause a decrease in terminal growth.—*Weed Abstr.*, **8**, No. 94.

Particular herbicides.

(*See also* 1373e.)

1328. Statens Forsøgsvirksomhed i Plantekultur.
Allylalkohol til bekaempelse af ukrudt. **(Allyl alcohol for weed control.)**
Meddel. Stat. Forsøgsvirks. Plantekult. **606,** 1958, pp. 4.

In two years' trials at 4 Danish experiment stations pre-emergence treatment with allyl alcohol, 5–10 c.c. per sq. m. 2 days before sowing, gave good weed control in spinach. Yields of onions were depressed by the chemical.

1329. Chiapparini, L.
Sul diserbo in pre-trapianto e in pre- e post-emergenza col cloro-isopropil-fenilcarbammato (CIPC). **(Pre-transplanting and pre- and post-emergence weed control with chloroisopropylphenylcarbamate (CIPC).)** [English summary ¼ p.]
Not. Mal. Piante, 1958, No. 45/46, pp. 39-45.

Celery was unharmed by soil treatment before transplanting, with either 6·75 kg. CIPC per ha. in 970 l. or 10·75 kg. in 1,560 l. After 30 days, the weed infestation was 15% and 5% respectively of that on untreated plots. Carrots sown a week after soil treatment benefited greatly from lack of weed competition when CIPC was used at 3·75 kg. in 1,200 l. per ha. Treatment with 3·5 kg. per ha. in 1,000 l. at the cotyledon stage caused slight initial scorching, but subsequent growth was better than in the controls, and weed cover was practically nil. At half this rate of CIPC the carrot seedlings were unharmed, and weed cover was 10% after 30 days. Asparagus in its 3rd year was undamaged by an early March application of 4 kg. per ha. in 1,500 l., but the associated spinach and lettuce seedlings were killed by this treatment. Pre-emergence treatment with 4 kg. in 600 l. per ha. did not impede germination of spinach and radish seeds, but killed most of the seedlings. The surviving radish roots were elongated instead of globular and the leaves were chlorotic. When treated at the first foliage leaf stage with 3·5 kg. per ha. in 1,000 l., the radishes reacted similarly. Onion seedlings at the "hook" stage were mostly killed by CIPC at 3 kg. per ha. in 1,200 l. Gladiolus corms planted in treated soil developed slightly chlorotic shoots at first, where the rate was 8·5 kg. per ha. in 1,000 l., but their subsequent growth was normal. At half this rate there was no chlorosis. Weeds showing the greatest resistance to CIPC were species of *Polygonum*, *Chenopodium*, *Artemisia* and *Amaranthus*. The moderately resistant included species of grasses, composites, clovers, *Stellaria*, *Oxalis*, *Anagallis*, *Nasturtium* and *Convolvulus*.

1330. Gausman, H. W., and Trevett, M. F.
Studies on the retention of radioactive dalapon. (Na-2,2-dichloropropionate-2-C^{14}.)
Me Fm Res., 1958, **6** (3): 17-21.

Electrodialysis studies of various components of a blueberry soil showed that, as the ratio of anions to cations increased, the retention of dalapon by the soil component also increased. The B horizon, which had the highest retention of dalapon, was lowest in amounts of anions removed by electrodialysis. There was no relation between pH and dalapon retention. Soil organic matter was inversely related to dalapon retention. Retention of dalapon by aqueous clay suspensions was increased by the addition of ceric sulphate. Suspensions of bentonite retained dalapon completely, and suspensions of attapulgite treated with ceric sulphate retained dalapon much better than attapulgite alone. It is hoped to use these data in the formulation of safe herbicides for weed control in blueberries.

1331. Rahn, E. M., and Baynard, R. E.
Persistence and penetration of monuron in asparagus soils.
Weeds, N. York, 1958, **6**: 432-40, bibl. 8.

In a 3-year study using bio-assays, monuron did not persist from one year to the next when applied twice annually at 1·6 lb./ac., the rate used by most asparagus growers. When 3·2 lb./ac. was used, 0·3–0·4 lb./ac. persisted from one year to the next but did not accumulate. Depths of penetration, and disappearance from the soil as affected by dates of application and environmental conditions are discussed.—From *Weed Abstr.*, **8**, No. 91.

1332. Jansen, L. L., Gentner, W. A., and Hilton, J. L.
A new method for evaluating potential algicides and determination of the algicidal properties of several substituted-urea and *s*-triazine compounds.
Weeds, N. York, 1958, **6**: 390-8, bibl. 12, illus.

The method, using nutrient-moistened perlite as a substrate and employing greenhouse culture conditions, is described. In a preliminary evaluation of 14 chemicals considerable algicidal potential and favourable comparison with copper sulphate were shown by 4 substituted-urea herbicides and 7 *s*-triazine derivatives.—From *Weed Abstr.*, **8,** No. 52.

Particular weeds.

1333. FELDMAN, I.
Un arma nueva para combatir al chañar. **(A new weapon against *Geoffraea decorticans*.)** [English summary $\frac{1}{3}$ p.]
Rev. Fac. Agron. La Plata, 1957, **33**: 167-74, bibl. 5, illus.

This woody leguminous shrub was highly resistant to the usual methods of land clearance, and to spraying with mixtures of 2,4-D and 2,4,5-T, but good control was achieved by injecting an undiluted mixture of equal parts of these herbicides into the trunk at the base. An injecting apparatus is described and illustrated.

1334. TIMMONS, F. L., WELDON, L. W., AND LEE, W. O.
A study of factors which influence effectiveness of amitrol and dalapon on common cattail.
Weeds, N. York, 1958, **6**: 406-12, bibl. 12, illus.

Early season applications of amino triazole and dalapon were less effective on *Typha latifolia* than late season applications at a more mature stage of growth. Twenty lb./ac. in split doses was much more effective than 10 lb./ac. and as effective as 40 lb./ac. Forty gal./ac. was as effective as higher volumes with amino triazole, but the relation of volume rate to effectiveness of dalapon was not clear. The addition of diesel oil and emulsifier greatly increased dalapon's effectiveness but not that of amino triazole.—*Weed Abstr.*, **8,** No. 54.

1335. BYLTERUD, A.
Control of couch grass (*Agropyron repens* P.B.) with trichloroacetic acid.
Acta Agric. Scand., 1958, **8**: 265-78, bibl. 51, illus.

In pot experiments TCA at 15 and 30 kg./ha. was most effective against couch grass when applied just before frost. It was least effective when 4 weeks' growth had been made after freezing and was of intermediate effect just after frost.

1336. GRIGSBY, B. H.
Comparisons of pre-emergence and post-emergence applications of herbicides for the control of crabgrass.
Abstr. Weed Soc. Amer., 1958, p. 46.

Ester, acid and amide formulations of 2,4-D, 2,4-DES, CIPC, NPA, CDAA, diuron, neburon, chlordane and a mixture of metallic arsenicals were tested pre-emergence against crabgrass (*Digitaria* spp.) growing in turf. Their effectiveness appeared to depend upon solubility and rate of breakdown; the arsenicals gave seasonal control. Post-emergence disodium methyl arsonate, sodium 2,3-dichloro-isobutyrate and oil were more effective than PMA±2,4-D, chlordane in oil and endothal, reducing crabgrass seed head counts to less than 2 per sq. ft.—*Weed Abstr.*, **7,** No. 2244.

1337. RACOVITZA, A.
Carum ajowan Benth et Hook, une nouvelle et intéressante plante nourricière de l'*Orobanche ramosa* L. **(*Carum ajowan,* a new and interesting host plant of *Orobanche ramosa*.)**
J. Agric. trop. Bot. appl., 1958, **5**: 491-6, bibl. 25.

Root secretions of *C. ajowan* caused the seeds of *O. ramosa* to germinate. The distance over which the roots were effective and the persistence of the secretion in the soil have been studied. It is suggested that *Carum* could provide a valuable means of control by stimulating *Orobanche* to germinate but would not support the parasite sufficiently for it to seed itself again. The secretions did not stimulate the germination of the seeds of *O. cumana* or *O. brassicae*.

1338. RAWAT, V. S., AND AMBASHT, R. S.
Root relations of *Orobanche* and its hosts.
Curr. Sci., 1958, **27**: 445-6, illus.

Brassica spp. as host plants of *Orobanche* had longer and more developed roots which sometimes extended towards the parasite's roots with negative geotropic curvature. It is suggested that the host roots may be attracted by exudations from *Orobanche* and may derive some benefit from the association.

Control of aquatic weeds.

(*See also* 1373a, h, i.)

1339. BATES, G. R., AND PHIPPS, J. B.
Water hyacinth and its control in Southern Rhodesia.
Paper read at *1st Afr. Weed Control Conf.*, 1958, pp. 6, bibl. 3, illus.

At present a 3: 1 mixture of the isopropyl and butyl amines of 2,4-D at 3 lb./ac. is used to control *Eichhornia crassipes*, and various (unspecified) esters have also given good results. Chemical methods are supplemented by hand clearance.—From *Weed Abstr.*, **7,** No. 2206.

1340. GRIGSBY, B. H., AND HAMILTON, R. H.
New techniques in the application of herbicides for the control of aquatic weeds.
Abstr. Weed Soc. Amer., 1958, p. 56.

This paper describes the use of granular herbicides formulated on an inert carrier which sinks through the water so placing the herbicide in contact with the roots of aquatic weeds. 2,4-D (ester) 20–70 lb./ac. applied on granular clay or in pellets of bentonite was effective against most aquatic weeds for

6 months to 2 years. Granular simazin, diuron and CDEC were active against blue-green and green algae. [See also *H.A.*, 28: 3574.]—*Weed Abstr.*, **7**, No. 2196.

Weed control in fruit crops.

(*See also* 1330, 1373d, f.)

1341. Hemphill, D. D.
Poison ivy and horse nettle control beneath bearing apple trees.
Abstr. Weed Soc. Amer., 1958, [p. ?].

Amino triazole [ATA] 4 lb./100 gal. killed poison ivy [*Rhus radicans*] and horse nettle [*Solanum carolinense*] without injury to apple trees; 2,3,6-TBA 3 lb./100 gal. gave fair kill of ivy and nettle with severe injury to the leaf and flowers of the apple trees the following spring.—*Weed Abstr.*, **7**, No. 2255.

1342. Dermine, M. E., and Detroux, M. L.
Rôle des herbicides chimiques en culture fruitière basses-tiges. (**The role of chemical herbicides in the culture of low-worked fruit trees.**)
Fruit belge, 1958, **26**: 182-4, 197-200.

Simazine and CMU gave the best results in early trials of several preparations in young apple and pear orchards.

Weed control in ornamentals. ,

1343. (Pridham, A. M. S.)
Weed control developments of interest to nurserymen.
Flor. Exch., 1958, **131** (14): 23-4.

Three new materials are described, viz. mylone, simazine and neburon. Recommendations from Cornell University still include CIPC, which gave excellent weed control from both autumn and summer application. Simazine is likely to replace CIPC for application immediately after spring planting, due to its wider coverage of weed species. Neburon gave good weed control, and crop tolerance was satisfactory at 8 lb./acre active ingredient. Spring application of granular simazine at 4 lb. active ingredient per acre reduced the need for hoeing until July.

1344. Chiapparini, L.
Sul diserbo col 3-amino-1,2,4-triazolo (ATA). Primo contributo. Secondo contributo. Trattamenti in pre-emergenza delle bulbose da fiore e da allevamento. (**Weed control with 3-amino-1,2,4 triazole (ATA). Part 1. Part 2.—Pre-emergence treatments of bulbs intended for flowering and for vegetative propagation.**) [English summaries 5 and 10 lines.]
Not. Mal. Piante, 1958, No. 45/46, pp. 46-59, bibl. 6, and pp. 60-76, bibl. 5, illus.

Tulip shoots which had already emerged became temporarily chlorotic after application of ATA at 1·5 kg. per ha., but subsequent growth and flowering were normal. Tulip and iris bulbs planted in December were unaffected by 2 pre-emergence soil applications, a week apart, each of 2·5 kg. in 600 l. per ha., and weed control was very good. April treatment with either 2·5 or 7 kg. in 600 l. per ha. before emergence of tuberose shoots produced better plants than those in untreated control plots. Gladioli intended for vegetative propagation developed temporarily chlorotic shoots only if planted superficially and when the soil treatment following planting was either 5 or 14 kg. ATA in 1,200 l. per ha., but they completely recovered later. When the application was 3 or 6 kg. in 1,800 l. per ha., the few shoots already emerged became slightly and temporarily chlorotic, but within 4 weeks all plants in the treated soil were normally green and better developed than the controls. Young plants of *Verbascum phlomoides* were killed by an application of 7·5 kg. per ha.; those in flower survived, but their leaves fell prematurely. Pinks (*Dianthus barbatus*) were slowly killed by 6·5 kg. per ha. The critical application rate for onions at the stage of 4–5 leaves was 2·5 kg. per ha. and that for carrots or parsley was somewhat lower. In general, annual weeds were satisfactorily controlled by a single application of ATA in the seedling stage at 2·5–7·5 kg. per ha., but most perennial weeds required a second treatment when they had produced chlorotic shoots as a result of the first. In general, a 9-kg. per ha. application followed by one of 5 kg. per ha. was adequate. *Amaranthus* spp. proved very resistant, and *Portulaca oleracea* increased greatly in resistance with age. Effective rates and application times are given for control of weeds in ditches and of individual species elsewhere, including 7 grasses, species of *Amaranthus*, *Artemisia*, *Carex*, *Chenopodium*, dock (*Rumex*), *Nasturtium*, *Oxalis*, *Plantago*, *Polygonum*, *Ranunculus*, *Stellaria*, *Symphytum* and *Urtica*, also *Capsella bursa-pastoris*, *Convolvulus sepium*, *Erigeron canadensis*, *Galium molluga*, *Melilotus officinalis*, *Myosotis palustris*, *Portulaca oleracea*, *Potentilla reptans* and *Solanum nigrum*.

1345. van der Graaf, A. J.
Chemische onkruidbestrijding. (**Chemical weed control.**)
Jaarb. Proefst. Boomkwek. Boskoop 1957, pp. 80-6.

Woody plants. Simazine at 10 kg./ha. applied in April, 2 weeks after planting *Chamaecyparis* spp. and cuttings of privet and *Rosa multiflora*, gave adequate weed control until the end of August. Autumn application of simazine (5 kg./ha.) kept 1-year-old plants of *Daphne mezereum* clean. *Herbaceous plants.* Simazine at 3·5 kg./ha. controlled weeds in *Phlox*, *Astilbe*, *Delphinium* and

Pyrethrum without phytotoxicity. *Seedbeds.* Weed control was excellent after treatment with Shell W (800 l.)+CIPC (4 l.)/ha. and PCP-oil (30 l.)+CIPC (4 l.)/ha. PCP-oil+CIPC was an excellent pre-emergence spray for many broad-leaved plants and certain conifers. A pre-emergence spray of Shell W (800 l./ha.) was effective with *Chamaecyparis* and *Thuja*. Shell W+CIPC may be applied during the dormant period to perennials.

1346. Pridham, A. M. S.
Response of weeds and ground covers to miscible and granular formulations of CIPC.
Abstr. Weed Soc. Amer., 1958, p. 16.

Granular mixtures of CIPC and 2,4-DES gave better weed control than CIPC alone. CIPC 4 lb.+2,4-DES 4 lb./ac. reduced hand weeding without seriously injuring *Vinca minor*, *Pachysandra terminlis*, *Hedera helix*, *Euonymus fortunei* or *Forsythia intermedia*. [See also *H.A.*, 29: 351.]—*Weed Abstr.*, **7**, No. 2157.

1347. Bing, A.
Weed control for peonies.
Bull. N.Y. St. Flower Grs, 1958, No. 154, p. 6, illus.

The application of diuron as Karmex DW (2 lb. of 80% material in 100 gal. per acre), of diuron as a 2% granular formulation (100 lb. per acre), of simazin (10 lb. of 50% wettable powder in 100 gal. per acre), or of neburon (8 lb. per 100 gal. per acre) at the end of December, after removing the tops and rototilling, resulted in weed-free peony beds at cutting time. Weed control without plant injury was also maintained until late summer by doubling the rates of application of these herbicides.

Weed control in tropical and sub-tropical crops.

(*See also* 1373c, 1884.)

1348. Fleming, S. D.
Perennial grasses as a limiting factor in tropical agriculture and methods for their control.
Paper read at *1st Afr. Weed Control Conf.*, 1958, pp. 28, bibl. 18.

The first part of the paper reviews the problem of perennial grass weeds in tropical Africa, including their control by hand and mechanical cultivation, the use of cover crops, shading by the crop, shade trees or shrubs, mulching and herbicides. The second part considers couch grasses in various crops. A table gives the response of 10 grasses, which are a problem in coffee, to dalapon and amino triazole (ATA), and another table the response of 21 broad-leaved weeds and 7 other weeds to 7 herbicides. In coffee the best results on both grass and broad-leaved weeds were given by dalapon+ATA (4: 1) or dalapon+MCPA or +2,4-D. It is recommended that dalapon should not be used at rates above 5 lb./ac. and that young trees should not be treated at all. Split applications of dalapon have tended to give better results than single treatments. Coffee may be planted with impunity 2–4 months after applying 10–20 lb./ac. of dalapon, and young tea planted 3 months after applying 30 lb./ac. also appeared unaffected. Preliminary trials on 2-year-old tea suggest that dalapon at 5–15 lb./ac. may give useful grass control with little and only temporary injury. Mature tea treated with 20 and 40 lb./ac. had growth checked for 6 weeks, but there was little effect on total yield and none on colour, texture or flavour. In sisal 20 lb./ac. 2 months before planting caused no injury and the same rate on young transplants only caused marginal necrosis to the outer leaves; young bulbils are highly susceptible to dalapon. Pineapples are susceptible to 10 lb./ac. dalapon at any one application; 10 lb./ac. in 2 applications with a 2-month interval caused no injury, nor did 30 lb./ac. 2 months before planting. Sodium monochloroacetate and light oils have given good results in pyrethrum.—From *Weed Abstr.*, **7**, No. 2249.

1349. Guyot, H., and Olivier, P.
Herbicides par atomisation, 2^{e} partie. (**Low volume application of herbicides. Part 2.**)
Fruits d'Outre Mer, 1958, **13**: 325-7.

The control of weeds in bananas is discussed. This can be accomplished by the use of contact herbicides, of which PCP, 15% at 8 to 20 l./ha., is recommended, and also by using mixed herbicides such as PCP plus diuron, at 8 l. and 2 to 3 kg. respectively. 2,4-DES at 6 kg./ha. may be used instead of PCP. Modifications of these treatments according to the weather and frequency of application are considered. [For Part 1, see *H.A.*, 28: 3599.]

1350. Rodriguez, O.
Observações sôbre tolerância de citrus a alguns herbicidas comerciais. (**Observations on the tolerance of citrus to certain commercial herbicides.**) [English summary 10 lines.]
Rev. Agric. Piracicaba, 1958, **33**: 167-78, bibl. 4, illus.

In a preliminary experiment comparing 2,4-D, TCA, diesel oil, Premerge (the alkanolamine salt of DNOSBP), dalapon, Karmex W (3-(*p*-chlorophenyl)-1: 1-dimethylurea) and a product containing 75% of sodium chlorate, diesel oil gave the most promising results when single herbicides were used, but the best weed control was given by a mixture of 24% diesel oil, 0·7% Premerge, 0·3% emulsifier and 75% water, applied 4–5 times a year for 2 years, when the weeds were 6–8 cm. high. In a second experiment the orange trees were injured by a mixture of 1·5 g. of 40% 2,4-D and 2 g. of 90% TCA per sq. m. *Imperata brasiliensis* was the most resistant weed, against which the most effective herbicides were sodium chlorate or a mixture of 2,4-D and TCA. The most economic herbicides were this mixture (at half the concentration which had proved toxic to the crop), and the diesel oil mixture slightly modified to contain 21·7% oil and 0·2% emulsifier.

1351. Forster, R.
The use of herbicides in coffee plantations.
Abstr. Weed Soc. Amer., 1958, p. 3.

TCA (sodium) applied pre-emergence to coffee plants in sandy soil caused yellowing of leaf margins, leaf fall and death of main top branches at rates above 9 lb./ac.; more resistance was shown in clay soil. Monuron 6–7 lb./ac. pre-emergence caused burning of leaf tips and main branches. A 0·1–0·5% solution of 2,4-D (sodium) in water produced slight symptoms; dalapon 14 lb./ac. applied at the start of the rainy season produced no symptoms.—*Weed Abstr.*, **7**, No. 2180.

1352. Ivens, G. W.
The control of couch grasses in coffee.
Paper read at *1st Afr. Weed Control Conf.*, 1958, pp. 8.

Results are given of several trials. In one, in which *Cynodon dactylon* was sprayed when 6 in. or 12 in. tall, amino triazole 10 lb./ac. gave better results than dalapon 10 lb./ac. on the first date, which was followed by wet weather, but worse results on the second date, which was followed by dry weather. Dalapon at 5 lb./ac. applied to *Digitaria scalarum* 10 days after cutting, i.e. when 6–9 in. high, in a very wet period appeared to give 100% kill; amino triazole was less effective but it controlled broad-leaved weeds. Spraying was carried on up to the trunks of the coffee trees and, in the process, the bases of the trees and low hanging branches were wetted. Amino triazole at 10 lb./ac. caused some leaf tip chlorosis but after 16 weeks the effects were no longer visible nor did growth appear to be affected. The effects of dalapon were slower and more marked, but the removal of couch competition seemed to more than compensate for any damage caused. In other trials dalapon caused more injury, and it is thought that the trees may have been weaker and rainfall insufficient to leach the chemical out of the root zone. [See also *H.A.*, 28: 2479.]—From *Weed Abstr.*, **7**, No. 2250.

1353. Guzman, V. L.
Effect of time and method of dalapon-2,4-D application on sugar cane, seedling grasses, and weeds on organic soils.
Abstr. Weed Soc. Amer., 1958, p. 4.

Dalapon 5+2,4-D 1·5 lb./ac. had no significant effect on yield of 96° sugar when applied as an overall, directional or combined spray at 3 stages of growth. Cane yield was reduced by late season applications (23 April and 23 May). [See also *H.A.*, 28: 1353 and 29: 357.]—*Weed Abstr.*, **7**, No. 2168.

1354. Guzman, V. L., and Orsenigo, J. R.
The effect of rate and time of dalapon application on stubble cane and seedling grasses on organic soils.
Abstr. Weed Soc. Amer., 1958, pp. 4-5.

Preliminary results are given of a trial in which dalapon at 1–5 lb./ac. was sprayed 1, 2 and 3 times on sugar cane, variety CL 41-223, 3, 4 and 5 months after harvest. Two applications of 5 lb./ac. or three of 3 and 4 lb./ac. gave good control of *Eleusine indica* and *Digitaria* spp. There was no significant difference in yield of cane or 96° sugar between treatments and the control.—*Weed Abstr.*, **7**, No. 2167.

1355. Rochecouste, E.
Comparative effectiveness of 4-chloro-2-methyl phenoxyacetic acid and 2,4-dichlorophenoxyacetic acid derivatives in pre-emergence control of weeds in sugar cane fields in Mauritius.
Paper read at *1st Afr. Weed Control Conf.*, 1958, pp. 7, bibl. 3, illus.

In 14 trials in different places MCPA (sodium and potassium) 4 lb./ac., 2,4-D (sodium, triethanolamine and dimethylamine all 4 lb./ac., butoxyethanol and isopropyl both 1·5 lb./ac. and ethyl 1 lb./ac.) were compared in 3- to 4-month-old cane or a fortnight after harvest. The decreasing order of effectiveness of the compounds was MCPA, 2,4-D (sodium and dimethylamine), 2,4-D (butoxyethanol and triethanolamine), 2,4-D (isopropyl and ethyl). Seven species of weeds were resistant to all the formulations and 3 were affected only temporarily.—From *Weed Abstr.*, **7**, No. 2251.

1356. Vallance, L. G.
Guinea grass and para grass control.
Cane Grs' quart. Bull., 1958, **22**: 66-8, illus.

Good control of young guinea grass was obtained with 2,4-D plus PCP and creosote. Older areas responded to 2,4-D plus Pentasote, 4 lb.+4 gal. in 100 gal. water per acre. Dalapon, at 20–30 lb./acre, has given good but costly control of guinea grass on headlands and roadsides and of para grass in irrigation and drainage channels. For the latter purpose TCA at 100 lb./acre has been the most effective material yet tried.

1357. Barrie, A. G.
Better pre-emergence weedicides—at a price.
Cane Grs' quart. Bull., 1958, **22**: 47-8.

CMU gave the best control of weeds in sugar cane but is at present too expensive for use in Australia. MCPA was more effective than 2,4-D, but it is doubtful whether its greater cost would be offset by the better control obtained.

Weed control in turf.

(*See also* 1336.)

1358. Nutter, G. C., and Burt, E. O.
Plantbed sterilisation for turfgrasses.
Abstr. Weed Soc. Amer., 1958, p. 48.

One hundred per cent control of nutgrass (*Cyperus rotundus*) and Bermuda grass (*Cynodon dactylon*) was given by methyl bromide, 78% and 95% by Mylone at 400 lb./ac., and 98% and 95% by Vapam at 150 gal./ac. Calcium cyanamide 1 ton/ac. allowed an increase in *C. rotundus* and gave 40% control of *C. dactylon*; 4 tons/ac. gave 91% and 90% control respectively.—*Weed Abstr.*, **7**, No. 2258.

1359. Kalbfuss, H. W.
Erfolgreiche Moosbekämpfung in Rasenflächen. (**Successful control of moss in lawns.**)
Gartenwelt, 1958, **58**: 418.

Moss was successfully controlled by applying a mixture of 32·5 g. ammonium sulphate, 32·5 g. iron sulphate, 1·4 g. mercuric chloride and 63·6 g. sand to 1 sq. m. of lawn.—Bot. Garten, Kassel.

1360. Grigsby, B. H., Wittwer, S. H., and Tyson, J.
Observations on some effects of combinations of 2,4-D and gibberellic acid on turf grasses and weeds.
Abstr. Weed Soc. Amer., 1958, p. 47.

2,4-D (ester) 2 lb./ac.+gibberellic acid (potassium) 0·125 lb./ac. applied in the early season (17 April) failed to control buckhorn plantain (*Plantago aristata*) and dandelion (*Taraxacum officinale*), and induced rapid growth of Kentucky bluegrass, bermuda grass and quackgrass (*Agropyron repens*); growth of Meyer Zoysia, chewings fescue and bentgrass was unaffected. No antagonism was evident with late season (2 May) applications of the mixture, or with separate applications of 2,4-D and gibberellic acid.—*Weed Abstr.*, **7**, No. 2257.

1361. Long, J. A., and Holt, E. C.
Post-emergence control of clover with chemicals in bermuda grass turf.
Abstr. Weed Soc. Amer., 1958, pp. 47-8.

2,4-D (amine) 0·75 and 1·25 lb./ac., 2,4,5-T (amine) 1·25 lb./ac., endothal 4 lb./ac., 2,4,5-TP 1·25 lb./ac. and ammonium nitrate 215 lb.+2,4-D 0·5 lb./ac. gave complete control, and ammonium nitrate 215 lb./ac., 2,4,5-TP 0·75 lb./ac., 2,3,6-TBA 2 lb./ac. and endothal 2 lb./ac. gave 83–99% control of *Medicago hispida*. Endothal 4 lb./ac. and 2,3,6-TBA caused slight to moderate, and ammonium nitrate ±2,4-D severe, discoloration of the bermuda grass turf.—*Weed Abstr.*, **7**, No. 2256.

Weed control in vegetables.

(*See also* 1328, 1329, 1331, 1344, 1373b, g.)

1362. Shipinov, N. A.
Chemical weed control in the USSR.
Proc. 9th int. Conf. Quar. Plant Prot., Moscow, 1958, 1958, pp. 13.

For vegetable crops pre-emergence application has proved the most reliable and widely used method, and in this context the following compounds are mentioned: DNC, PCP, ammonium nitrate and ammonium sulphate, calcium cyanamide and mineral oils on growing weeds, and CIPC and the butyl ester of 2,4-D before weed emergence. The value of herbicides to control weeds after crop emergence is considered to be very limited, except in carrots.

1363. Wurgler, W.
Le désherbage des aspergières. (**The weeding of asparagus beds.**)
Landw. Jb. Schweiz., 1958, **7**: 551-5, bibl. 4, illus.

Trials made from 1955 to 1957 have shown that asparagus beds can be weeded by using monuron at the rate of 2 kg. of active ingredient per hectare or simazine at the rate of 1 kg. a.i./ha. If necessary, the dose of simazine may be increased to 2 kg. a.i./ha. without harmful effect. The treatment is best given either immediately after cutting has finished or after earthing up and then again after cutting is over.

1364. Roberts, H. A.
Dinoseb pre-emergence. 3 lb. per acre can keep runner beans clean.
Grower, 1959, **51**: 166-7, illus.

Dinoseb (amine) applied at 3 to 4 lb. per acre gave adequate weed control in runner beans in 3 seasons. There was no difference in weed control between applications made immediately after sowing and just before bean emergence. In 2 of 3 trial years dinoseb had no adverse effect on germination or yield, but germination was delayed when heavy rain fell after application. Yields from dinoseb-treated plots were greater than from plots which were cultivated between the rows, and were equal to those from hand-weeded plots.—Nat. Veg. Res. Stat., Wellesbourne.

1365. Wiltse, M. G.
Some effects of herbicidal oils on beans.
Diss. Abstr., 1958, **19**: 30, being *L.C. Card No. Mic* 58-2371 of 90 pp.

The experimental herbicidal oils which caused little injury to stems of *Phaseolus vulgaris* varieties were LS-0133 (90% mineral spirits, 10% Indocene 70), LS-0150 (90% mineral spirits, 10% Indosolvent 2), LS-0152 (85% mineral spirits, 15% Indocene 70), LS-0155 (40% mineral spirits, 40% Alkylate, 20% Indosolvent 2) and LS-0237 (heavy naphtha). No significant reduction in yield occurred following oil application in the field, and about 75% weed control was obtained, being more effective with grasses than with broad-leaved weeds. Ten gallons per acre of a herbicidal oil gave better weed control than 5 gal. per acre and less injury to bean plants than 20 gal. per acre. A second application gave slightly more injury but did not decrease yield. Resistance of bean stems to oils appeared to decrease with age. The best stage for spraying was at the appearance of the first trifoliate leaf. Herbicidal oil applications at 60° F. were less phytotoxic than at 70° or 80° F. Bean stems with closed stomata suffered less damage than those with open stomata.—Mich. St. Univ.

1366. Swingle, H. D.
Pre-emergence weed control in broccoli and cauliflower on mineral soils.
Abstr. Weed Soc. Amer., 1958, pp. 17-18.

Texas 107 broccoli and Snowball E cauliflower treated pre-emergence were killed by simazine 2 lb./ac., stunted by CIPC 2 lb./ac. and ethyl-N,N-di-n-propylthiocarbamate 5 and 8 lb./ac., and least affected by TCA (sodium) 6 lb./ac. and CDEC 4 lb./ac.—*Weed Abstr.*, **7**, No. 2150.

1367. Bohr, K.
Feststellung der Karenzzeit nach einer chemischen Queckenbekämpfung bei Spinat, Feldsalat, Kopfsalat und Hafer. **(Determination of the time necessary, after the chemical control of couch, before sowing spinach, lamb's lettuce, head lettuce and oats.)**
Gesunde Pflanze, 1959, **11** (1): 7-10.

Amino triazole (ATA) 10 kg./ha., dalapon 25 kg./ha. and TCA (sodium) 50 kg./ha. were applied to a clay-loam soil at the end of July. Crops were sown 14, 25 and 57 days later; rainfall during those intervals was 29·1, 66·7 and 110·2 mm. Spinach: at the first 2 dates dalapon and TCA caused 70–96% reduction in germination, at the third date neither had much effect; ATA delayed germination at the first date but had little or no effect at the other 2 dates. Lamb's lettuce and head lettuce: at the first 2 dates dalapon and TCA were highly injurious, at the last date neither had any effect; ATA was injurious at the first date but had little or no effect at the other dates.—From *Weed Abstr.*, **8**, No. 192.

1368. Picco, D.
Il cianato di potassio (KOCN) nel diserbo chimico delle colture di cipolla. **(Potassium cyanate (KCNO) in chemical weed control in onion crops.)** [English summary ¼ p.]
Not. Mal. Piante, 1958, No. 45/46, pp. 149-57, bibl. 4, illus.

Recommendations based on experiments are as follows. Onion crops should be sprayed, preferably at the 2-leaf stage, with 15 kg. of potassium cyanate in 13–16 hl. of water per ha. and this should be repeated 2 days later. For plants between the "eyelet" and "whip" stages, sprays should consist of 10 kg. of cyanate in 8–10 hl. per ha., and from the "whip" to the 1-leaf stage 20 kg. in 12–13 hl. About 14 days after treatment the onion seedlings became temporarily chlorotic, and some leaves, especially those in an oblique position during treatment, were severely injured, but there was a satisfactory recovery in the following 16 days. Application of the cyanate as dust mixed with an equal quantity of chalk was less convenient than spraying, but when used at the same rate as the first spray treatment above, damage to the crops was less severe. The most resistant weeds were grasses, *Fumaria officinalis*, *Equisetum arvense*, and species of *Sonchus* and *Euphorbia*.

1369. Bleasdale, J. K. A.
The yield of onions and red beet as affected by weeds.
J. hort. Sci., 1959, **34**: 7-13, bibl. 6.

The results are presented for 3 factorial experiments which measured the effects of 2 weed densities and of 3 dates of weeding on crops of onions ("Best of All" in 1956 and "Sutton's A1" in 1957) and Detroit (globe) red beet. Reducing the weed density by pre-emergence herbicide treatment increased the crop yields and reduced the amount of labour needed to hand-weed the rows. Very early weeding produced the highest yields; the longer it was delayed, the smaller was the marketable yield. Crop quality was not greatly affected by weed competition at the early stages of growth. It is concluded that pre-emergence weed control sprays could be profitably used on crops that are to be hand-weeded later or on crops where post-emergence herbicides can be applied only at a fairly late stage of growth. [Author's summary.]—Nat. Veg. Res. Stat., Wellesbourne.

1370. Leefe, J. S.
The effect of 4 (MCPB) and 4 (2,4-DB) applied post-emergence on Perfection peas grown for canning.
Abstr. Weed Soc. Amer., 1958, p. 15.

MCPB and 2,4-DB (sodium salt and butyl esters), and 1: 15 mixtures of MCPA with MCPB and 2,4-DB were applied to weed-free Perfection peas when 6 in. tall at rates up to 20 oz. a.e./ac. After 1 week slight stem distortion was evident with MCPB 4 oz./ac. and more severe distortion with 2,4-DB. At harvest plants showed no effects with no significant reduction in yields of shelled peas.—*Weed Abstr.*, **7**, No. 2144.

1371. Swingle, H. D., and Colditz, P.
Pre-emergence weed control in spinach.
Abstr. Weed Soc. Amer., 1958, p. 18.

CDEC 2 and 3 lb./ac., ethyl-N,N-di-n-propylthiolcarbamate 5 and 7 lb./ac., CIPC 1 and 1·5 lb./ac. reduced yield and increased seed stalk formation of a spring crop of Hybrid No. 7 spinach.—*Weed Abstr.*, **7**, No. 2151.

1372. MENGES, R. M., AND ALDRICH, R. J.
Effects of 2,4,5-TES on the growth of the tomato plant.
Abstr. Weed Soc. Amer., 1958, p. 15.

Young tomato plants were more susceptible to 2,4,5-TES than mature plants. Subsurface applications disrupted stem tissue and retarded growth of young and mature plants, soil surface applications had the greatest effect on young plants.—*Weed Abstr.*, **7**, No. 2149.

Noted.

1373.

a BUYCKX, E. J. E., AND TAS, R. N.
Essais d'éradication de la jacinthe d'eau, *Eichhornia crassipes* Solms, à l'aide d'un helicoptère à turbine. **(Experiments on the eradication of *E. crassipes* Solms, by the use of a turbo-helicopter.)**
Paper read at *1st Afr. Weed Control Conf.*, 1958, pp. 19, bibl. 11, illus.
Promising results with 4 kg./ha. 2,4-D in 8 l. applied through a standard boom with 28 Teejets.—From *Weed Abstr.*, **7**, No. 2205.

b DAVIS, D. E., AND FUNDERBURK, H. H.
Variability in susceptibility to injury by DNBP.
Weeds, N. York, 1958, **6**: 454-60, bibl. 3.
The test plants included bean and pea; in general large seeded species were more resistant.—From *Weed Abstr.*, **8**, No. 106.

c DAY, B. E.
Weed control programs for citrus, avocado orchards.
Calif. Citrogr., 1958, **44**: 44, 60-1.
Practical recommendations for 8 orchard situations.

d LOEWEL, E. L., AND MOHS, H.-J.
Zur Unkrautbekämpfung im Obstbau. **(On weed control in fruit trees.)**
Mitt. ObstVersuchsringes Jork, 1958, **13**: 260-1, bibl. 5.
Promising preliminary results obtained with simazine and simazine plus ATA.

e MONTGOMERY, D.
Recent experience with non-selective herbicides.
Park Administ., 1958, **23**: 323-7.
Chemical weed control methods for non-agricultural land.

f VAN OORSCHOT, J. L. P., AND VAN STAALDUINE, D.
Chemische onkruidbestrijding bij de teelt van kleinfruit. **(Chemical weed control in small-fruit growing.)**
Fruitteelt, 1958, **48**: 1038-9, illus.
Control recommendations for annual weeds and couch grass.

g PETERSEN, H. I.
Årsoversigt for Statens Ukrudtsforsøg 1957. **(Annual Report of the Danish Institute for Weed Research 1957.)** [English summary 1¾ p.]
Tidsskr. Planteavl, 1958, **62**: 615-26.
Monuron promising for weed control in asparagus.

h TIMMONS, F. L., AND KLINGMAN, D. L.
Control of aquatic and bank weeds.
Soil Conserv., 1958, **24**: 102-7, illus.
Losses due to aquatic and bank weeds and methods of controlling them.

i WILSON-JONES, K.
Aquatic weed control.
Span, 1958, No. 3, pp. 26-9, bibl. 8, illus.
A review.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 1017, 1018, 1031, 1060, 1061, 1067, 1068, 1077b, o, q, t, 1078b, h, 1176g, 1362-1372, 1553a, f, 1665, 1996.)

1374. NAALDWIJK (VAN SOEST, W.).
Jaarverslag 1957, van het Proefstation voor de Groenten- en Fruitteelt onder Glas te Naaldwijk. **(Annual Report of the Research Station for Vegetable and Fruit Growing under Glass, Naaldwijk, for 1957)**, pp. 159, illus., fl. 2.50.

Most of the research reports are preceded by general articles on the work of the various sections. *Water relations:* irrigation frequencies for tomato and lettuce; water table studies with various salt concentrations; trickle irrigation for tomato, carnation and frame cucumber. *Soilless culture:* growing cucumbers and tomatoes; minor element studies with tomato; preparation of nutrient solutions. *Manuring:* application of artificials to cucumber, tomato and cauliflower and of organics to tomato. *Cultural trials:* with flowers (storage temperature for nerine, temperature effects on freesia growth, forcing Wedgwood iris, and winter-flowering snapdragon), tomato (including grafting on corky-root-resistant stocks and ring culture), eggplant and sweet pepper (grafting), lettuce (time of planting, ventilation and soil pots), melon and cucumber (planting distances and grafting). *Physio-*

logical studies: root development of scorzonera, tomato and lettuce; P^{32} uptake by young tomato and cucumber plants; sugar-nitrogen foliar sprays for tomato; artificial illumination of tomato, sweet pepper and lettuce, shading for chrysanthemum. *Fruit set and growth substance experiments:* with tomato, melon, cucumber, radish and glasshouse plums. *Breeding and variety trials:* plum, grape, freesia, egg-plant, sweet pepper, lettuce, endive, spinach, bean and cauliflower. *Storage and packing:* melon, tomato, cucumber, cauliflower and grape. *Pest, disease and weed control* with various crops.

1375. NORDMEYER, H.
Versuche mit Folie und Niederglas. (**Studies with plastic and glass lights.**)
Gartenwelt, 1958, **58**: 382-4, illus.

Temperature studies in a light structure over tomatoes showed that, under glass, temperatures were about 10° C. higher than in the open, and that temperature changes under glass were less sudden than under plastic. Fruit yields and quality from protected plants were much better than from outdoor plants. Similar temperature trends were obtained in frames with kohlrabi and dwarf beans, but differences in air temperatures between protected and outdoor crops were less than with tomatoes.

1376. SLOBODJANIK, N. I.
Variations in the quality of vegetable seeds in relation to cleaning and grading. [Russian.]
Agrobiologija, 1958, No. 5, pp. 134-7.

Tomato seeds from the lower half of the fruit were larger and denser and gave rise to more productive plants than those from the upper half. Heavy seed can be separated in a 1: 10 alcohol-water solution. Carrot seed was heaviest in the main umbel of the central stem and onion seed in the middle ring of the inflorescence. When seed of both species was separated in a pneumatic grader the heaviest samples germinated best and gave rise to the most productive plants. In radish, seed from the lower inflorescence was superior to that from the middle, while that from the upper inflorescence was the poorest.

1377. POTAPOV, A. I.
Washing vegetable seeds as a means of increasing their germination. [Russian.]
Uč. zap. Mosk. Obl. ped. In-t, 1956, **41**: 187-96, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,569.

In experiments on germinating seeds of onion, beetroot and carrot together with barley, the vegetable seeds had a toxic effect on the barley germination. Seeds of low germinating capacity and water extracts of such seeds were also toxic. Litmus paper showed that the seeds gave off ammonia, and it was found that seeds that germinated poorly contained tyrosine, while the others did not. Conditions favourable for protein hydrolysis (increased temperatures and seed moisture) caused a reduction in germination due to the toxic action of the ammonia produced. Washing seeds in running water for 20–24 hrs to remove the ammonia greatly increased germination.

1378. KOAZE, Y., SAKAI, H., AND ARIMA, K.
Studies on substances promoting seed germination, which are produced by microorganisms. Part 1. Selection of strains.
J. agric. chem. Soc. Japan, 1957, **31**: 338, from abstr. in *Res. Rec. Fac. Agric. Tokyo*, 1956–1957, No. 7, pp. 28-9.

Extracts and filtrates (at a concentration of 1: 100) of certain species of moulds, yeasts and bacteria promoted germination of pea and cabbage seed, and pea germination was also promoted by a streptomyces species. At 1:10 several of these substances inhibited pea and cabbage germination. Vitamin B at low concentrations promoted pea germination; all plant hormones which were tested had an inhibiting effect on germination. Of the antibiotics tested, 12 promoted pea germination; of these neomycin-B, penicillin-G, sarcomycin and streptomycin had the greatest effects. At high rates of application 8 antibiotics were strongly inhibitory to pea seed germination, and one adversely affected cabbage seed germination.

1379. TAKASHIMA, S., IZUTA, S., AND KITAO, H.
Effect of plant-hormones on the seed production of fruit and vegetables.
Stud. Inst. Hort. Kyoto, 1957, **8**: 112-15, bibl. 15.

Trials on F_1 seed production showed a considerable increase in seed production in cucurbits resulting from spraying the stigmas with NAA or other hormones at flowering time immediately before pollination. The effect of hormone treatment was greater on tomato than on red pepper and egg plant seed production.

1380. ROHLOFF, I.
Krankheiten an Saatgut. (**Seed-borne diseases.**)
Gartenwelt, 1958, **58**: 419-21, illus.

Experience gained in seed testing is discussed. A polythene grid, 5 cm. high, was used to separate seeds during germination tests. Germination of disinfected and untreated seed was also compared. Captan was found to be a satisfactory dressing for legumes, spinach and carrot seeds, but not for lettuce.—LandwKammer, Münster.

1381. BIELKA, R., AND KALETTA, K. H.
Versuche zur Gemüsejungpflanzenanzucht mit unterschiedlich hergestellten Erdballen. (**Studies in raising vegetable seedlings with various methods of soilball formation.**)
Dtsch. Gartenb., 1958, **5**: 260-2, bibl. 5, illus.

Tomato and cabbage seedlings were raised in clay pots, and in soil pots (consolidated or loose). With both crops in soil pots direct sowing gave better results than pricking out. The ability of roots to hold together was greater in consolidated soil pots (2 kg./cm.^{2}) than in loose soil pots. Round soil pots are preferred to square ones, because they encourage even rooting throughout the medium.—Karl-Marx-Univ., Leipzig.

1382. Sugiyama, T., and Takahashi, K.
Nitrate tests as a means of diagnosing the nutritional status of vegetable crops. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 161-70, bibl. 22.

Nitrates were found in the leaves and stems of most of the vegetables tested except in *Allium* leaves. Nitrate contents of mature leaves were higher than those of younger leaves, and were higher in mature and lower leaves than in newly-opened ones. In plants grown in sand culture with constant levels of nitrate, contents were low in young tissue, reached a maximum in middle age, and decreased after maturity. In turnip petioles nitrate contents did not alter during the day or during 3 days' storage at room temperature in darkness or in diffused light. When plants were supplied with ammonium N only, no nitrates were found in the leaves. In young radish and chinese cabbage plants nitrate contents were low in plants given high rates of ammonium sulphate in the field. Changes in nitrate supply were reflected in the leaves of komatsuna grown in sand cultures. The nitrate reduction process in plants is discussed in relation to diagnosis of the N nutritional status. Rapid tissue tests by the Bray's reagent method and the diphenylamine method were simple and convenient for diagnosing N deficiency of vegetable crops in the field. Tissue analysis using phenyldisulphonic acid is another method for diagnosing N status, which is effective with correct sampling, and with definite standards for critical levels.

1383. Geissler, T.
Die Wirkung verschiedener Einbringungsformen des Superphosphates in Feldversuchen mit Gemüsepflanzen. (**The effect of various methods of superphosphate application in field trials with vegetables.**) [Russian and English summaries ⅓ p. each.]
Arch. Gartenb., 1958, **6**: 283-308, bibl. 16.

On a neutral low-lying bog soil and on an acid sandy soil superphosphate was applied at 50 kg./ha. as a powder, granulated with or without organic additions (peat or compost), or as an organic-mineral mixture, either broadcast or in the row, to celeriac, cabbage, beans, spinach and carrots. On the bog soil first-year yields were increased up to 25% by in-the-row applications of superphosphate, particularly when applied with organic additions. The effects of phosphate were less on the sandy soil, but row application did increase the yields of late beans and spinach.—Inst. Gartenb., Grossbeeren.

1384. Weber, A.
Magnesiumgebrek. (**Magnesium deficiency.**) [English summary 7 lines.]
Tijdschr. PlZiekt., 1958, **64**: 399-401, illus.

Symptoms of Mg deficiency in a soil high in K were corrected in several plants by sprays of 5% magnesium sulphate. Yields from a tomato variety susceptible to Mg deficiency and grown in this soil were increased more by foliar than by soil application of magnesium sulphate during the first year of application, but this difference was reduced as treatment continued. The nasturtium variety Golden Gleam was found to be a satisfactory indicator plant for Mg deficiency.—Stat. plantepat. Forsög, Lyngby.

1385. Crooke, W. M.
Effect of heavy-metal toxicity on the cation-exchange capacity of plant roots.
Soil Sci., 1958, **86**: 231-40, bibl. 20.

Sand-cultured tomato, pea and french bean plants were supplied with Ni, Co, Cu, Zn and Mn separately at toxic levels. Tomato plants were far more sensitive than peas or beans to all 5 heavy metals, and, except with Ni, were more markedly reduced in yield of tops than of roots, the lowest yields of both being produced by Cu. All 5 elements reduced root yields in peas, but only Cu and Zn decreased top yields. With this crop the most generally toxic element was Cu, but top yields were reduced more severely by Zn. For beans Zn was the most toxic, affecting tops more than roots, and Mn caused a considerable fall in top yield. Cation-exchange capacity of the roots of all 3 crops was increased by Ni, Co and Zn, and decreased by Cu and Mn. All 5 elements increased Ca absorption in tomatoes and decreased it in peas. The Ca content of bean plants was decreased by Cu, Mn and particularly Zn, and was slightly increased by Ni and Co.—Macaulay Inst., Aberdeen.

1386. Fröhlich, H.
Untersuchungen über die Ansprüche der Gemüsearten an die Bodenfeuchtigkeit. (**Studies on soil moisture demands of vegetables.**) [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1958, **6**: 217-82, bibl. 46, illus.

Crops included in studies on the relations between soil moisture and plant growth were cabbages, tomatoes, celeriac, leeks, beetroot, carrots and dwarf beans, and optimum ranges of soil moisture have been determined for each crop. The ratio of percentage marketable yield of cabbages to waste decreased as the plots became drier; this was more marked with savoy than with head cabbage. The ratio of picked green beans to fresh weight of leaves decreased and the proportion of root to leaf in beetroot also decreased with increasing soil moisture.—Inst. Gartenb., Grossbeeren.

1387. Bierhuizen, J. F., and Ploegman, C.
Wortelgroei en waterhuishouding. (**Root growth and water relations.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1958, **21**: 484-90, bibl. 10, illus.

Root development in relation to soil type, moisture tension, and water table was studied with radish, lettuce, bean (*Vicia*), tomato and spinach plants in the glasshouse. In sandy soils roots were finer and more branched than in clay soils. In all the test plants except spinach roots reached depths between 50 and 70 cm.; with spinach rooting was shallower. At pF 3, which equals 50% available water, the growth rate of bean roots was 10–15% of that at field capacity (pF 2). Similar effects were observed with other crops. Crop growth with 2 water levels (−30 and −50 cm.) was observed, but results with May Queen lettuce were inconclusive. With radish, tomato and spinach yields were lower at the higher water table.—Inst. Cultuurtech. Waterhuishoud., Wageningen.

1388. Hardie, M.
Sunflowers as a cover crop for market gardens.
J. Agric. W. Aust., 1958, **7**: 457-8, illus.

A successful cover crop of sunflowers was grown in a market garden in the Spearwood district of Western Australia. Seed was sown at the rate of 27 lb. per acre and 5 weeks later, when the plants were 5 ft. tall and still growing vigorously and all the weeds which had germinated had been smothered, the crop was ploughed in. J.R.L.

1389. Schuphan, W., and Weinmann, I.
Essentielle Aminosäuren in unseren Nahrungspflanzen als Grundlage für eine gegenseitige Aufwertung von Pflanzenproteinen. (**Essential amino acids in our food plants as a basis for comparative evaluation of plant proteins.**) [English summary ¾ p.]
Qual. Plant. Maveg., 1958, **5**: 23-44, bibl. 33.

Contents of crude protein and essential amino acids are recorded for broad beans, ripe and unripe peas and runner beans, cabbage types, brussels sprouts, kale, cauliflower, broccoli, kohl-rabi, turnip tops, spinach, swiss chard, swede, corn salad, lettuce, chicory, leek and asparagus. Nutritive values are compared with those of animal proteins.—Bundesanst. QualForsch. pfl. Erzeugn., Geisenheim/Rheingau.

1390. Sugawara, T.
Studies on vitamin C in field and garden crops.
Rep. Inst. Agron., Fac. Agric. Tokyo, 1957, pp. 1-82, from abstr. in *Rec. Res. Fac. Agric. Tokyo*, 1956–1957, No. 7, pp. 2-3.

A 40% reduction in the light intensity given to spinach resulted in a reduction in ascorbic acid content by about 30%. Ascorbic acid content was also affected by soil nutrient content, and high soil N was associated with high ascorbic acid contents. The effect of P and K was much smaller than that of N. It was shown that the presence of chlorophyll b was not essential for the formation of ascorbic acid. There was a definite increase in ascorbic acid content of spinach plants with growth, but after maximum growth was reached the ascorbic acid content was reduced. Tomatoes showed some increase in ascorbic acid content with fruit ripening, but mature green fruits may have a similar content to red, ripe fruits. The ascorbic acid content of strawberries increased considerably with ripening. Broad beans and green peas, however, showed a maximum ascorbic acid content when young, the content decreasing as the seed matured.

1391. Ogata, K., and Inoue, T.
Studies on the storage of perishable agricultural products. (6) The variation of the ascorbic acid content during storage in certain vegetables harvested at different stages of maturity. [Japanese, with English summary 21 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 101-5, bibl. 11.

Conclusions reached are: (1) That the ascorbic acid contents differ according to the degree of maturity at harvesting, and its decrease during storage varies according to the initial content at the time of harvest in onions, green peppers and chinese cabbages (*Brassica chinensis*). (2) The initial content at harvest is as above, but the decreasing tendency is not related to initial content in egg plants, cucumbers and spinach. (3) Initial contents at different stages of maturity are quite similar, and the decreases during storage are also entirely similar in tomatoes and potatoes.

1392. Ark, P. A., and Hildebrand, D. C.
Comparative antibiotic activity of three brands of agricultural streptomycin.
Plant Dis. Reptr, 1958, **42**: 1206-7.

Agri-mycin, Agristrep and Phytomycin did not differ significantly in their behaviour when applied to greenhouse-grown cucumbers either as wettable or dust formulations.—Univ. Calif., Berkeley.

1393. Ark, P. A., and Thompson, J. P.
Prevention of antibiotic injury with Na-K-chlorophyllin.
Plant Dis. Reptr, 1958, **42**: 1203-5, bibl. 2, illus.

Injury caused by Acti-dione, aureomycin, patulin, streptomycin sulphate or Terramycin to bean and cucumber plants was completely prevented by adding 1% Na-K-chlorophyllin to the antibiotics [see also *H.A.*, 29: 463]. A lower concentration of the chlorophyllin did not eliminate injury.—Univ. Calif., Berkeley.

1394. Ark, P. A., and Thompson, J. P.
Streptomycin formulations and their relation to the concentration of the antibiotic in the cell sap of various plants under different conditions.
Plant Dis. Reptr, 1959, **43**: 72-8, bibl. 8.

The rate of release of streptomycin by successive aqueous extractions was more gradual from Nuclay than from calcium carbonate or dust formulations with agricultural gypsum. When streptomycin was dusted on cucumber leaves, its presence in the plant juice was detected after 5 min., reaching a maximum after 1 day. Wilting of the plants or low temperatures at or after treatment had little effect on streptomycin absorption. Streptomycin penetration into leaves of woody species was similar to that into leaves of herbaceous species.—Univ. Calif., Berkeley.

1395. Ark, P. A., and Thompson, J. P.
Stability of streptomycin dust formulations.
Plant Dis. Reptr, 1959, **43**: 79-80, bibl. 2.

Streptomycin dust formulations made in Pyrax ABB, Nuclay, sulfur, or lime rock did not appreciably diminish in potency during the 3 years of dry storage in paper bags at 23° to 25° C. [Authors' abstract.]—Univ. Calif., Berkeley.

1396. Nickell, L. G.
Growth effects of antibiotics on plant cells and their reaction to a modified Gram stain.
Phyton, 1958, **11**: 93-6, bibl. 9, illus.

Single hypocotyl cells of *Phaseolus vulgaris* responded to antibiotics in a manner similar to that of Gram negative bacteria, showing significant growth inhibition, even at concentrations as low as 1 p.p.m. The Gram stain, used as for bacteria, was not retained by the plant cells.—Chas. Pfizer and Co. Inc., Brooklyn, N.Y.

1397. Wright, W. E.
The black beetle (*Heteronychus sanctaehelenae* Blanch.).
Agric. Gaz. N.S.W., 1958, **69**: 422-7, illus.

The stems of transplanted tomato, cabbage and cauliflower seedlings and dahlia and other garden plants are sometimes so severely damaged by these beetles that they die. Young fruit trees and vines are occasionally attacked. The larvae damage the roots of turf. Control measures using DDT, BHC or dieldrin are outlined. J.R.L.

1398. Everett, P.
The green vegetable bug.
N.Z. J. Agric., 1958, **97**: 469-72, bibl. 3, illus.

Nezara viridula may be controlled by sprays of DDT, 1 lb. of 50% w.p. per 100 gal., HETP or TEPP, 1 pint and ½ pint respectively per 100 gal., malathion emulsion, 1 pint per 100 gal., or lindane, 2 lb. of 25% w.p. per 100 gal. Biological control measures are also discussed.

1399. Button, J. A.
Root maggot flies.
J. Agric. W. Aust., 1958, **7**: 559-61, illus.

Wet pelleting the seed with insecticides plus a fungicide and a sticking agent has been successfully used to control bean fly. Surface treatment after planting was successful only if the insecticide was applied to the open trench before covering the seed. Several common insecticides were effective. Onion fly control may be achieved by dipping wetted seeds in insecticide powder before planting. Surface treatment after planting may also prove effective using aldrin dust or, if the pest has appeared, chlordane or dieldrin.

1400. National Institute of Agricultural Engineering.
Report on test of "Pylebro" standard vegetable washer.
Rep. N.I.A.E. **176,** 1958, pp. 11, illus.

The machine was suitable for washing root crops and some bunched crops, but was not so suitable for tender leafy crops. It was of particular value with a limited water supply. The soil on the vegetables should not be allowed to dry out before washing.

Artichokes.

1401. Ustimenko, G. V.
The results of a study of varietal differences in Jerusalem artichoke. [Russian, with English summary 12 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 5, pp. 103-16.

On the basis of phenological data, growth characteristics, dry matter accumulation, development of assimilatory surface and photosynthetic activity, an original classification is offered of the commonest varieties of Jerusalem artichoke grown in the U.S.S.R. Three main groups are distinguished: early-maturing, short-stemmed varieties with compact clusters of tubers; mid-season long-stemmed varieties with spreading tubers; and late varieties with a habit similar to that of the early ones.

Asparagus.

(*See also* 1552g.)

1402. Henriksen, A.
Gødningsførsog i asparges. (**Manurial trials with asparagus.**)
Tidsskr. Planteavl, 1958, **62**: 453-64.

The results are set out of manurial trials conducted on a light soil at Hornum in 1934–42 and on a sandy loam at Spangsbjerg in 1939–49. On the whole yields rose with the supply of either stable manure or artificials. The omission of N and K caused reduction in yield, and in soils rich in P the omission of P proved beneficial. Nitrate was shown to be preferable to ammonium sulphate because of the latter's effect on the soil reaction; it should be applied immediately after harvest. In the better soil at Spangsbjerg, however, the increase in yield resulting from nitrate applications was not very pronounced.

Brassicas.

(*See also* 1019, 1048, 1378, 1381, 1391, 1552r, x, y, 1553i.)

1403. Cole, H. M.
An economic study of the broccoli crop in west Cornwall. 5-year investigation 1952/53 to 1956/57.
Rep. Univ. Bristol Dep. Econ. **109**, 1958, pp. 50, 5s.

In the period 1952/1957 climate was the major factor affecting size of yields, and it is suggested that efforts should be concentrated on improving those other aspects of production which increase growers' returns. High returns per acre were associated with high yields, and yields were higher on soils with a high level of fertility than when broccoli was grown after another brassica crop. The use of improved seed will help to reduce the percentage of unmarketable heads. At the wider plant spacings bigger proportions of the larger-sized counts (heads per pack) were produced. The 2 largest cost items, manual labour and net manurial cost, showed the widest variations in the survey, and it is thought that some of the exceptionally high manurial costs may not be justified. It is suggested that investigations and trials aimed at increasing the proportion of good quality curds for market and the percentage of larger sizes, and also a study of the level of manuring required by the crop, would be of real benefit to growers.

1404. Hu, C.-C., and Huang, H.
The measurement of some characteristics of cabbage varieties. [Chinese, with English summary 1 p.]
Mem. Coll. Agric. nat. Taiwan Univ., 1957, **5** (1): 52-64, bibl. 8, illus.

In 2 successive years 18 local and introduced cabbage varieties were planted in September, and data were recorded up to February on time of maturity, size of head, shape of head and colour. Apart from one local variety, which bolted and should therefore be planted earlier, all the varieties produced some heads. The best early variety was Copenhagen Market; some other varieties were earlier, but the percentage that produced heads was much too low. The best mid-season variety was the local O–S Cross, which is, however, rather too large. Danish Roundhead was the best late variety.

1405. Landovský, F.
Opylovací poměry u semenných kultur květáku *Brassica oleracea*, var. *botrytis* L. **(Pollination conditions in cauliflower.)** [Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 969-74.

Emasculated cauliflower flowers were artificially pollinated before bud burst, and after pollination the stigmata were decapitated, without disturbing the remaining generative organs, at intervals from 30 min. to 21 hours. The best pod set, 57·1%, was produced by pollination lasting 3 hours 15 min., although even 30 min. duration gave 18·75% set. Cross-pollination has been found to give higher yields of better seed than self-pollination, and therefore, under natural conditions, warm weather favourable for insect visitation results in more satisfactory seed production.

1406. (Haworth, F.)
Fertilisers beat soil cultivations in cabbage trial results.
Comm. Gr, 1959, No. 3290, p. 165.

There was little difference in yield between plots of spring cabbage which had been shallow-ploughed, subsoiled, deep-ploughed or rotavated before planting. The biggest yield responses were obtained with farmyard manure and with N top-dressings. Potash gave no response until the third year, and no appreciable response until the fourth and fifth years. There was no response to phosphates. In growers' trials with applications of 0, 6, 12 and 18 cwt. nitro chalk per acre, yields from the high N plots were up to 3 times greater than from no-N plots.—Nat. Veg. Res. Stat., Wellesbourne.

1407. Iwata, M., and Eguchi, Y.
Effects of phosphorus and potassium on yield and seed quality of Chinese cabbage, after application at various stages of growth. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1958, **27**: 171-8, bibl. 12, illus.

Seed yields from plants supplied with P (15 p.p.m.) from planting (late September) until the end of flowering (late April) were similar to those from control plants supplied with P throughout growth. Yields were lower when P was only supplied until the early flowering stage or until inflorescence extension began. In plants supplied with P until flower bud differentiation only, seed yield was reduced to two-fifths of that of the control. Seed P contents were also directly related to the time at which P supply was stopped. Rate of germination was not affected by P treatments, but the initial rate of radicle elongation was less with smaller seeds. Plants supplied with 120 p.p.m. K from planting until full bloom (22 March), or until bolting, produced seed yields similar to those supplied with K at all stages of growth. When K was supplied only until flower bud differentiation, plants were severely K deficient, and seed yields were only one-third of those of the control. In treatments with no K in the early stages, growth became vigorous and seed yields were approximately normal if K supply began after mid-December. An application of K starting in mid-February, however, was too late for the plants to recover. There were no differences in seed K concentration, percentage germination and initial rate of radicle elongation between the K treatments.

1408. Strubelt, P.
Bodenuntersuchungen für Weisskohlfelder. **(Soil analysis for cabbage fields.)**
Industr. Obst u Gemüseverw., 1958, **43**: 233, from abstr. in *InformDienst Weihenstephan*, 1958, No. 8/9, p. 144.

The requirements of the cabbage crop in Lower Saxony were at least 12 mg. P_2O_5 and 20 mg. K_2O per 100 g. soil, the optimum pH value being 6·5–7. A good supply of P_2O_5 proved particularly important for the quality of the product.

1409. Sobačkin, A. A.
The effect of molybdenum on the growth and nitrogen metabolism of cauliflower. [Russian, with English summary 8 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 3, pp. 83-90, bibl. 17, illus.

In pot experiments with sand and with acid soil containing 15 mg. Al per 100 g., applications of sodium molybdate improved the growth of cauliflowers, the greatest yield increases being obtained with Mo at 0·5 mg./kg. sand and 5–10 mg./kg. soil. In the absence of Mo, deficiency symptoms occurred in the soil but not in the sand cultures. The addition of Mo also increased the total and protein N, amide and amino acid contents of the plants.

1410. Salter, P. J.
The effect of different irrigation treatments on the growth and yield of early summer cauliflowers.
J. hort. Sci., 1959, **34**: 23-31, bibl. 13.

Three experiments are described in which the response of early summer cauliflower plants to different soil moisture conditions in the field was determined. Two of the experiments were protected from rain by movable shelters. In the different treatments water was applied daily, or 25, 50 or 75% of the available soil moisture was allowed to be depleted before the plots were irrigated. At least 25% of the available soil moisture could be depleted before irrigation was required to maintain maximum growth rate. It was unnecessary to maintain the soil at field capacity to obtain maximum yields. For each treatment a close linear relationship was found between leaf area and curd size of plants at harvest. This relationship differed between treatments. [Author's summary.]—Nat. Veg. Res. Stat., Wellesbourne.

1411. Linser, H., Kiermayer, O., and Youssef, E.
Der Wuchsstoffgehalt verschiedener Brassica-Pflanzen in Abhängigkeit von ihrem Entwicklungszustand. **(The growth substance content of several *Brassica* spp. in relation to their state of development.)**
Planta, 1958, **52**: 173-86, bibl. 26.

The growth substance content of brussels sprouts, savoys, giant cauliflowers and summer rape was determined at different developmental stages by means of paper chromatography and a biological assay. In the seeds of cauliflower and savoy a growth substance was found to occur which had an action slower than indoleacetic acid and which probably did not contain any indole compounds. Indoleacetonitrile (IAN) appeared as soon as the seeds were soaked in water. With the occurrence of IAN the non-indole growth substances found in dry seeds disappeared. In the dry seeds of brussels sprouts and in the leaves of brussels sprouts and savoys there was strong evidence of the presence of indolecarboxylic acid. Dry and soaked seeds of rape did not show any significant growth substance activity. After the formation of green leaves IAN was the dominant growth substance in all developmental stages, the largest amounts occurring in the leaves. No IAN was present in the stems with the exception of rape, the stems of which differ morphologically from those of other *Brassica* plants studied. The absence of IAN in the stems suggests that relatively large amounts of IAN are not translocated from the leaves or that they are inactivated in the stem. With the exception of savoy, the roots contained only very small amounts of growth substances, but larger amounts of coloured, inactive spots occurred. In addition to IAN, cauliflower leaves and curds were found to contain small amounts of indoleacetic acid, while there was some indication of the presence of indoleacetaldehyde in savoy stems. In the R_f range of 0·5–0·7 a tendency to inhibition occurred in many cases. [Translation of authors' summary.]—Biol. ForschAbt. österr. Stickstoffwerke A.g., Linz. a.d. Donau.

1412. Bontea, V., and Bucur, E.
Două boli importante la varză și combaterea lor. **(Two important cabbage diseases and their control.)** [English, French, Russian and German summaries.]
Grăd., Via Liv., 1958, **7** (8): 40-4+summaries, illus.

The biology of *Xanthomonas campestris* and *Phoma lingam*, causal organisms of black rot and black leg respectively, is discussed. While no resistant variety to either disease was found, early varieties appear to suffer less from *P. lingam*. For control of both, hot water treatment of the seed, destruction of infected plant material, deep ploughing and a 3-year crop rotation are recommended.

1413. McEwen, F. L., and Hervey, G. E. R.
Control of the cabbage looper with a virus disease.
J. econ. Ent., 1958, **51**: 626-31, bibl. 17, illus.
Laboratory and field experiments showed that the virus which causes polyhedrosis of the cabbage looper (*Trichoplusia ni* (Hbn.)) is a highly virulent pathogen. Field tests on cabbage, cauliflower and broccoli were conducted, in which virus-killed cabbage loopers were triturated in water and applied at rates from 0·94 to 120 larvae per acre with a low volume sprayer applying 30 gallons per acre. In all of the four field experiments it was possible to initiate a polyhedrosis epidemic and thereby greatly reduce the cabbage looper population in such test plots. Although increased dosage caused more rapid disease progress, a dosage of 0·94 larvae per acre initiated a polyhedrosis epidemic. Six months' storage of the inoculum at 0° F. did not cause any apparent reduction in pathogenicity, nor was there any adverse effect noted when TEPP or spreader-sticker (Rohm & Haas B-1956) was added to the inoculum when applied. [From authors' abstract.]—N.Y. St. agric. Exp. Stat., Geneva.

1414. Wolfenbarger, D., and Hibbs, E. T.
Insecticides and spray schedules for the control of cabbage leaf feeding Lepidoptera.
J. econ. Ent., 1958, **51**: 443-5, bibl. 2, illus.
Insecticides and schedules of application were tested for the control of the cabbage leaf-feeding complex of diamond back moth (*Plutella maculipennis*), imported cabbage worm (*Pieris rapae*) and cabbage looper (*Trichoplusia ni*). Control was evaluated by visual rating of leaf damage. Endrin at 0·25 lb./ac. was the best in 1956, followed by Guthion, parathion and Thiodan at 0·75, 0·33 and 0·50 lb./ac. respectively. In 1957 endrin and parathion at 0·3 lb./ac. applied weekly were equally effective and phosdrin was nearly as good. Fortnightly applications of DDT at 1 lb./ac. were inferior to weekly applications of DDT at the same rate, to toxaphene at 2 lb./ac., and to parathion applied weekly or fortnightly.—Iowa St. Coll., Ames.

1415. Yendol, W. G., and Gould, G. E.
The effect of insecticidal soil drenches on the growth of young cabbage and muskmelon plants.
J. econ. Ent., 1958, **51**: 534-8, bibl. 5.
Soil drenches of insecticidal emulsions, commonly used in Indiana in transplanting cabbage for the control of cabbage maggot, and occasionally for the control of cutworms around hills of melons, have been known to injure the plants. Emulsion formulations of 6 insecticides—aldrin, chlordane, dieldrin, endrin, heptachlor and lindane—and emulsion formulations of their respective solvent-emulsifiers were tested at 6 dilutions on cabbage and 18 dilutions on muskmelon plants. Results based on the number and weight of surviving plants indicated that muskmelon plants were more sensitive to the drenches than cabbage plants and that in general the solvent-emulsifier formulations were more toxic than their respective complete emulsion. Of the 6 materials tested, formulations of aldrin and chlordane were less toxic to young cabbage and muskmelon plants than formulations of dieldrin, endrin and heptachlor, which in turn were less toxic than the lindane formulations. [From authors' abstract.]—Purdue Univ., Lafayette, Ind.

1416. Greidanus, P.
Bewaring van sluitkool in de Langedijk. Een onderzoek naar de bewaarverliezen en de voor de bewaring benodigde hoeveelheid arbeid. **(Cabbage storage in the Langedijk area. An investigation of storage losses and labour requirements.)** [English summary 18 lines.]
Meded. Dir. Tuinb., 1958, **21**: 754-7, illus.
Losses during storage in old barns (half stone walls, natural ventilation) were slightly greater than those in new barns (partition walls, forced ventilation), but losses were appreciably smaller in cold stores than in barns. Man-hour requirements for cabbage storage are tabulated.—Inst. Bewar. Verwerk. Tuinbouwprod., Wageningen.

1417. (Parsons, C. S.)
Maintaining cabbage quality.
Agric. Mktg, 1958, **3** (10): 10.
Tests in which cabbages were stored for over 6 weeks at 32°, 38°, or 45° F. in unlined crates or crates lined with perforated and unperforated polyethylene, indicated that the best storage conditions were the lowest temperature using crates lined with unperforated or sparsely perforated plastic.

Celery.

1418. Therman, E.
Cultivation of celery under long-day conditions.
Arch. Soc. zool. bot. fenn. Vanamo, 1957 (issued 1958), **12**: 95-107, bibl. 20, illus.
Celery is not cultivated in Finland, but the trial reported here suggests that it could be profitably grown in the south of the country and perhaps much farther north. Plants of 4 American varieties were raised in a heated glasshouse in April and were planted out in early June. Thereafter, during June, the temperature often fell to near 0° C. and on several occasions frosts occurred. Despite this no plants bolted, from which it is tentatively concluded that celery is a short-day plant needing

both cold and short photoperiods for flower induction. Of the 4 varieties tried the best in terms of both yield and quality was Tall Utah 52-70H. The anatomy of the petioles of the 4 varieties is described and illustrated.—Dep. Hort., Univ. Helsinki.

1419. ANON.
New pascal celery developed in Florida.
Amer. Veg. Gr, 1958, **6** (10): 8.

The new pascal celery variety Emerald, developed at Everglades Experiment Station, is highly resistant to early blight, shows considerable resistance to black heart and is more tolerant of high summer temperatures than other varieties grown locally. It is, however, rather brittle and under some conditions is susceptible to node cracking. There is some variation in height, colour and rib length, but it is considered to be sufficiently uniform for commercial use. J.R.L.

1420. N.A.A.S.
Advice on controlling carrot fly on celery.
Grower, 1959, **51**: 314.

Drenching newly-set plants with aldrin, dieldrin or lindane is one method which has controlled carrot fly on celery. Sprays of the same materials applied immediately after planting and twice at 3-week intervals have also given good results. Dipping the plants before planting gives some control, but should be supplemented by spraying.

Cucurbits.

(*See also* 1020, 1049, 1076, 1379, 1415, 1552k, o, 1553 l.)

1421. ALEKSANDROW, S. W.
Die Wirksamkeit heterozygoter Gurkensamen. (**The efficiency of hybrid vigour in cucumbers.**)
Gartenwelt, 1958, **58**: 421-2.

Some results are given of hybridization between cucumber varieties in Russia. Klinsky was an effective female parent, giving good crops, which ripened early. Yields of the progeny, however, were 32·3–116·9% higher than those of Klinsky. Combinations of Leningrader Treibhaus with Klinsky or Best of All as male parents also produced early, high-yielding progeny. In a glasshouse trial comparing 4 of these new hybrids with Klinsky, total yields were 15·6% to 36·7% higher from the hybrid varieties than from the parent.

1422. MEŠČEROV, É. T.
Production of high yielding hybrid seed of cucumber. [Russian.]
Tr. prikl. Bot., Genet. i. Selekc., 1957, **31** (2): 223-5, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,856.

Yield increases of up to 29–36% were obtained from seed derived from natural crosses between two morphologically distinct varieties, for example Omsk × Astrahan and Ržav × Astrahan. To produce hybrid seed the use is recommended of Japanese forms distinguished by a low number of male flowers, earliness and disease resistance and also of other Far Eastern varieties.

1423. SHIMOKAWA, M., AND SUGIYAMA, C.
Experiment on the forcing of cucumbers. No. 4. Cultivation in a vinyl house. 1. [Japanese, with English summary ¼ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 37-40, illus.

The highest air temperature at night and the maximum growth and yield of cucumber plants were obtained in a plastic greenhouse, in which the plants were covered by plastic cloches and the soil heated by underground electric cables. The plastic cloches without soil heating produced better results than soil heating alone. [For Part 3, see *H.A.*, 28: 1416.]

J.R.L.

1424. VAN WINDEN, E. P.
Bitterness in cucumbers demands special attention. [Dutch.]
DE KLEINE, A. P.
Cucumbers free from bitterness in dutch light structures. [Dutch.]
Groenten en Fruit, 1957, **12**: 1331, and 1958, **13**: 1581, from abstracts in *Inform-Dienst Weihenstephan*, 1958, No. 8/9, p. 145 and No. 10, p. 165.

The relationship between bitterness and temporary moisture deficiency in cucumbers is discussed and suggestions are made for the constant maintenance of a humid atmosphere around the plants.

1425. ZAVALIŠINA, S. F.
The effect of boron on the development of vascular tissues in the stems of cucumber (*Cucumis sativus*). [Russian.]
Uč. zap. Leningr. gos. ped. In-t, 1955, **109**: 187-98, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,168.

Cucumber was grown in the spring and autumn in water cultures with and without B. In the spring, as the result of more favourable light conditions, the effect of B was more pronounced and appeared earlier (4 weeks) than in the autumn (7 weeks). In plants without B abnormal cambial activity occurred; the cross-sectional area of the vascular bundles increased following the expansion and deformation of undifferentiated cells formed by the cambium in the secondary xylem, and the apical meristem died. Absence of B was shown by the drying up of the young leaves, cessation of growth in the main stem and reduction in the number of stomata on the lower sides of the leaves.

1426. MEHANIK, F. JA.
Acetylene treatment as a method of increasing the formation of fruitful female flowers in cucumber. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **21** (11): 20-3, bibl. 1, illus.
The effect of acetylene on the development of female flowers in cucumber. [Russian.]
Sad i Ogorod, 1958, No. 10, pp. 13-15, illus.

Both these articles deal with experiments in which acetylene gas was applied to young cucumber plants. As a result the number of female flowers greatly increased, the yield of fruit rose significantly and maturity was advanced.

1427. VAN DIE, J.
On the occurrence of α-keto acids and organic nitrogen compounds in xylem exudates of cucumber and tomato plants.
Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1958, **61**: 572-8, bibl. 13.

Analysis of the xylem saps, which exude as a result of root pressure from severed stems of cucumber and tomato plants cultivated in soil, established the presence of relatively important amounts of pyruvic and α-ketoglutaric acids, together with large amounts of amino acids and their amides. Reducing substances were practically absent. Specially interesting seems the dominant position of glutamine in the organic nitrogen fraction, the absence of citrulline and α-alanine and the trace amounts of amino-dicarboxylic acids in the xylem exudates. Many other amino acids could be detected in small amounts, including proline. The significance of these findings is discussed. [Author's summary.]—Centre Plant Physiol. Res., Wageningen.

1428. VAN KOOT, Y., AND VAN DORST, H. J. M.
De invloed van enkele virussen op de bloemvorming bij komkommer. (**The effect of some virus diseases on flower formation in cucumber.**) [English summary ½ p.]
Tijdschr. PlZiekt., 1958, **64**: 432-9, bibl. 11.

In cucumber plants infected with Cucumis virus 1, the number of male flowers produced was doubled and the number of female flowers was halved, in comparison with healthy plants. Cucumis virus 2 had the opposite effect to a lesser degree. The ratio of male to female flowers is strongly influenced by the time of propagation in both virus-free and virus-infected plants. There was a direct association between tendril formation and female flower formation. It is suggested that virus infection may affect the auxin level of the plant.—Proefst. Groent. Fruit. Glas, Naaldwijk.

1429. HEROLD, F., AND BREMER, H.
Untersuchungen zur Epidemiologie, Ökologie und Bekämpfung des Gurkenmosaikvirus. (**Studies on the epidemiology, ecology and control of the cucumber mosaic virus.**) [English summary ½ p.]
Gartenbauwiss., 1958, **23**: 254-74, bibl. 32, illus.

Symptoms of Cucumber virus 1 Doolittle (CMV) observed on pickling cucumbers are described. The dependence of wilt and top necrosis on temperature during the incubation period is confirmed. Symptomless inhibition of growth was observed in mosaic-infected cucumbers. Diagnostic methods are discussed. CMV occurs in all cucumber growing regions of Western Germany. Strong differences in disease frequency are constantly observed in different regions. The possible reasons are discussed. There is no correlation between disease and vector frequency. Sometimes *Aphis fabae* is very injurious to cucumbers without even transmitting CMV. There was no evidence of virus transmission by seed. Transmission by contact occurs but does not seem to play an important role. The kind of spread of CMV in the field points to overwintering plants as important sources of virus infection. 46 weed, 12 ornamental, 9 vegetable and 4 woody plant species were tested for CMV infection, 18 of them with positive results. *Alliaria officinalis* and *Stellaria media* are shown to be host plants for CMV for the first time. The very common overwintering weed species *Stellaria media* proved to be often infected. It is likely to be an especially important source of infection. In one experiment mosaic-infected cucumbers were more injured by low temperature than healthy ones. Cucumbers cultivated in soil covered by manure suffered less from CMV. Losses from CMV can be reduced by the use of relatively tolerant cucumber varieties. [Authors' summary.]—Inst. f. Gemüseb. u. Unkrautforsch., Neuss-Lauvenburg.

1430. STANĚK, M.
Moření semen okurek antibiotickým přípravkem Fytostreptem (československým preparátem streptomycinu a terramycinu) proti bakteriové skvrnitosti listů okurek, vyvolávané bakterií *Pseudomonas lachrymans* (Smith et Bryan) Carsner. (**Cucumber seed treatment with the antibiotic Fytostrept (a Czechoslovak preparation of streptomycin and terramycin) against angular leaf spot of cucumber, caused by *Pseudomonas lachrymans*.**) [English, Russian and German summaties ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 1073-88, bibl. 27, illus.

Fytostrep contains a 14% mixture of streptomycin and terramycin at 10: 1. Soaking cucumber seed for 1–6 hrs in a 0·4% solution of this preparation prevented infection and stimulated germination and early seedling growth. When seed was sown in steam sterilized soil this method gave better results than treatment with the mercuric preparation Agronal at 0·2 g./100 g. seed. The use of disinfected seedbed soil is recommended to prevent fungal infection. The phytotoxicity of Fytostrep is relatively low and apparent only after soaking for more than 24 hrs in concentrations higher than 0·5%. In preliminary experiments the best results were obtained by soaking the seed for 24 hrs in a mixed solution of 0·1% Fytostrep and 0·002–0·004% Acti-dione.

1431. Sowell, G., Jr.
Cucumber fungicide testing on the west coast of Florida.
Plant Dis. Reptr, 1958, **42**: 1333-6, bibl. 6.

Nabam plus zinc sulphate has consistently given excellent control of downy mildew (*Pseudoperonospora cubensis*, and plants sprayed with this fungicide have produced the highest yield of marketable cucumbers. Zineb was equal to nabam $+ZnSO_4$ for downy mildew control, but reduced yields in one season. Maneb and nabam$+MnSO_4$ also caused yield reductions. Thiram gave excellent control of soil rot (*Rhizoctonia solani*), anthracnose (*Colletotrichum lagenarium*), and cottony leak (*Pythium aphanidermatum*). Ferbam partially controlled soil rot. Captan, maneb and nabam$+MnSO_4$ gave excellent control of anthracnose. Ferbam, captan, and zineb+neutral copper partially controlled cottony leak. [From author's summary.]—Gulf Coast Exp. Stat., Bradenton.

1432. Rankin, H. W., and Morgan, L. W.
The effect of lindane on cucumber yields when used with various fungicides.
Plant Dis. Reptr, 1959, **43**: 70-1, bibl. 5.

The application of 1 lb. of 25% lindane with copper fungicides (3 lb. per 100 gal.) caused a significant reduction in cucumber yields when compared to copper alone. There was no significant difference in cucumber yields between 3 carbamate materials, with or without lindane.—Ga Coastal Plain Exp. Stat., Tifton.

1433. Kefford, R. O., Smith, P. R., and Eager, L.
Rock melon variety trial.
J. Agric. Vict., 1958, **56**: 599-603, illus.

Chiefly on account of its superior carrying quality Hale's Best Powdery Mildew Resistant No. 45 proved a better commercial rock melon variety than Yates Conqueror, Yates Invader or Rocky Ford. It was easier to time harvesting correctly with Hale's Best and Invader than with the other varieties. Fruits of Rocky Ford did not travel well. The best quality fruit was obtained from Conqueror and Hale's Best, the former variety bearing fruit with a small seed cavity. Powdery mildew was found only on plants of Rocky Ford. J.R.L.

1434. Ivanoff, S. S.
Progress made in watermelon breeding work.
Miss. Fm Res., 1958, **21** (4): 2.

A list is given of 12 commercial varieties showing resistance to wilt and anthracnose. None has resistance to either gummy stem blight or virus diseases.

1435. Peterson, L. E.
How much nitrogen for melons?
Amer. Veg. Gr, 1958, **6** (11): 32-3, illus.

After pre-planting applications of complete manures, 3 levels of additional N were given, viz. none, medium (50 lb. per acre), and high (100 lb. per acre). The highest yields were obtained from medium N applications. The level of N application did not affect early yield or average weight of fruit. Rates of hollow heart were slightly increased with medium and high N levels. Time of N application had little effect on yield or quality.—Muscatine Is. Fruit Stat., Iowa.

1436. Paterson, D. R., and Smith, O. E.
High potash rates boost watermelon yields.
Bett. Crops, 1958, **42** (7): 12-15.

A 3×3×3 NPK experiment was carried out in 2 seasons on Charleston Gray watermelons grown on a fine sandy loam soil, in which the N content was medium-low and the P_2O_5 and K_2O contents very low. N had no effect on the yield of marketable watermelons in either year. K_2O at 100 lb./acre produced a significantly higher yield than no K_2O, and 200 lb. K_2O a significantly higher yield than 100 lb. P_2O_5 at 40 and 80 lb./acre only increased total yield in one year but caused highly significant increases in the yield of early watermelons in both years.—Tex. agric. Exp. Stat., and Prairie View A. & M. Coll.

1437. Hills, O. A.
Effect of curly top-infective beet leafhoppers on watermelon plants in different stages of development.
J. econ. Ent., 1958, **51**: 434-6, bibl. 2, illus.

Curly top-infective beet leafhoppers (*Circulifer tenellus* (Baker)) were placed on watermelon plants in different stages of development. Growth was severely retarded when plants were infested in the cotyledon stage, but they were apparently unaffected when infested in the two-leaf stage. [From author's abstract.]—Agric. Res. Serv., U.S.D.A.

1438. Marlatt, R. B., Allen, R. M., and McKittrick, R. T.
Control of cantaloup powdery mildew in Arizona with fungicides.
Plant Dis. Reptr, 1959, **43**: 67-9, bibl. 6.

Erysiphe cichoracearum was successfully controlled by fortnightly applications of $\frac{1}{2}$% karathane dust at 33 lb. per acre. Yields of marketable melons were increased, and karathane was not phytotoxic. Other treatments tested were ovotran dusts, and cycloheximide and lithium carbonate sprays. Powdery mildew incidence was estimated by counting mildew spots on 40 leaves per 56-foot plot, or classing 40 or 100 leaves as diseased or healthy. All three methods were equally accurate, but the 40-leaf classification was the easiest.—Ariz. agric. Exp. Stat., Tucson.

1439. Abastos, M., and Mercado, O.
Comparativo de insecticidas en el cultivo de las cucurbitaceas (melón y pepinillo). **(Comparison of insecticides for cucurbit crops (melon and gherkin).)**
Inf. mens. La Molina, 1958, **32** (371): 21-7.

The principal pest on the melon crop was *Diaphania* sp. Emulsions were applied 8 times, with the following quantities of insecticide per l.:—dieldrin 2·5 c.c., rothane 10 c.c., DDT 20 c.c. and 10 c.c., Folidol 1 c.c., and Dipterex 2 c.c. Folidol gave the best control but needed to be used at 6-day intervals. DDT at 20 c.c. per l. injured the crop, but at 10 c.c. per l. gave good results and showed the best residual action. Rothane and dieldrin were moderately satisfactory, but Dipterex was ineffective. Wettable sulphur at 7·5 g. per l., applied with the insecticides for control of mildew, scorched the plants, but at 3 g. per l. its action was very satisfactory. Reduction of bee populations by the insecticides was appreciable, but not serious. In a preliminary test with gherkins, the same pest was controlled more successfully by Folidol at 1 c.c. per l. than by a mixture of DDT and dieldrin at 6·5 c.c. per l. [For work on watermelon see *H.A.*, 28: 429.]

1440. Dvořák, M.
Lipoxidase in squash roots (*Cucurbita pepo* L.). [Russian, with English summary ¼ p.]
Biohimija, 1958, **23**: 891-4, bibl. 9.

Lipoxidase activity was measured in 7-day-old roots of squash grown in a nutrient solution with or without Ca, K, N, or P. A high level of activity was found and no effect of the absence of Ca, K, N or P, or of growing the plants for 3 days in darkness, was observed. Lipoxidase activity was not proportional to the endogenous respiration nor was it reduced by 10^{-3}M. NaN_3.

1441. Pisani, P. L.
Prove d'impiego delle gibberelline nella coltura degli zucchini. **(Tests on the use of gibberellins in growing zucchinis [a small type of marrow].)**
Riv. Ortoflorofruttic. ital., 1958, **42**: 320-4, bibl. 14, illus.

Seedlings of zucchini were planted in boxes in mid-February and sprayed weekly from mid-March to mid-April (5 treatments) with aqueous solutions of gibberellin at 50 or 100 p.p.m., the controls remaining untreated. Internodes were lengthened significantly by each of the 2 gibberellin levels. Treatment resulted in slightly, but not significantly, shorter leaves, with longer petioles than the controls. Stem length averaged 29·5 cm. after 50 p.p.m., 35 cm. after 100 p.p.m. and only 11 cm. without treatment, and the untreated plants had the most leaves. Treated plants were chlorotic and produced tendrils 8–10 cm. long, whereas those of the control plants were abortive. There was no change in flowering date, but the petals were longer, narrower and paler than normal and deformities in stamens and pistils were common. A month after the last treatment, normal chlorophyll content was restored and normal flowers were developing.

Legumes.

(*See also* 1021-1023, 1026, 1033, 1034, 1038-1040, 1303, 1378, 1383, 1385, 1552d, f, j, t, v, 1553c, d, g, j, 1586.)

1442. Monselise, S. P., and Went, F. W.
Effects of temperature on growth and dry matter accumulation of peas.
Plant Physiol., 1958, **33**: 372-4, bibl. 5.

Dry matter accumulation and elongation of Unica pea plants growing at two levels of day/night temperatures (10°/10° C., 10/20, 20/10, 20/20) over a period of one month were investigated. Elongation is greatest at high day-temperatures (20/20, 20/10) even if this means a lower total of degree-hours per daily cycle. Conversely, dry matter accumulation is highest at 10/10, followed by 20/10 and 20/20. The lowest is at 10/20 treatment, where leaf chlorosis is pronounced. Growth of roots is best at 10/10, and therefore also the top/root ratio is lowest, because of depressed growth of tops and unhampered or even increased translocation to roots; some data corroborating this view are presented. Curves of relative growth rate and net assimilation rate show initial negative values for treatments with 20° C. night temperature and late decline for treatments with 10° C. day temperature. [Authors' summary.]—Hebrew Univ., Rehovot, Israel and Calif. Inst. Tech., Pasadena.

1443. Highkin, H. R.
Temperature-induced variability in peas.
Amer. J. Bot., 1958, **45**: 626-31, bibl. 6, illus.

Pea (*Pisum sativum*) plants were grown under conditions of constant temperature and artificial light or in controlled-temperature greenhouses in which there was a diurnally fluctuating temperature. It was found that: (1) A constant temperature is inhibitory for growth despite the fact that it may be the most nearly optimal constant temperature; (2) the inhibitory effect of a continuous exposure to constant temperature is cumulative from generation to generation, reaching saturation with approximately the fifth generation; (3) differences in the temperature conditions of growth, whether constant or diurnally fluctuating, result in differences in the growth characteristics of the offspring of plants grown in these controlled conditions. The results of these experiments show that the phenotype of the plant is the summation of its genetic heritage together with the summation of the parent and present environment. Any environmental effect is inversely proportional to the number of generations by which that environment is removed from the generations under consideration. [Author's summary.]—Calif. Inst. Technol., Pasadena 6.

1444. LAMBERT, R. G., AND LINCK, A. J.
Effects of high temperature on yield of peas.
Plant Physiol., 1958, **33**: 347-50, bibl. 14.

Treatment of Alaska peas with high temperatures during a period from 5 days before full bloom to 15 days after full bloom reduced fresh weight, and the number of peas which were classed as canning size. All treatments at high temperatures were not equally effective in reducing yield of peas. When the data from plants receiving high temperature treatments were examined by combining plants treated for different durations and at different stages of development, it was found that exposure to 32° C. reduced yield more than 29° C. and 29° C. more than 27° C. Exposure to high temperature for 6-hour periods in the middle of the light period on 5 consecutive days reduced yield more than three days, and three days more than one day. Plants treated at five days after full bloom were most severely affected by high temperature. Plants treated five days after full bloom at 27°, 29°, or 32° C. and for one, three, or five days were lower yielding than comparable treatments at other stages of development. Within each of the four stages of development studied, fresh weight of peas was reduced more with increasing temperature from 27° to 29° to 32° C. and with increasing duration from one to three to five days. Within each temperature, the longer the treatment, the less the yield, and for each of the durations, the higher the temperature, the lower the yield. The practical application of results obtained in this study are discussed in view of breeding heat-resistant varieties of peas and selecting suitable areas for growing peas on a commercial scale. [Authors' summary.]—Univ. Minnesota, St. Paul 1, Minn.

1445. BUDNICKAJA, E. V., BORISOVA, I. G., AND PASYNSKIJ, A. G.
Changes in the lipid metabolism of plants through ionizing radiation. [Russian, with English summary ¼ p.]
Biohimija, 1958, **23**: 848-55, bibl. 40.

The X-ray dosages inducing changes in the lipoxidase system of the leaves of 10- to 14-day-old plants, including pea and bean, *in vivo* were 30–50% lower than those required to induce similar changes *in vitro*. The relative permeability of these leaves was altered, indicating a change in the internal cell structure with a leakage of electrolytes into the surrounding medium. Low dosages (1,000 r) gave a six-fold increase in the peroxides of unsaturated fatty acids in bean leaves.

1446. HENKENS, C. H.
Voorkòmen van kwade harten in erwten door bespuiting met mangaansulfaat. **(The prevention of marsh spot in peas by spraying with manganese sulphate.)**
Reprinted from *Landbouwvoorl.*, 1958, **15**: 262-5, illus.

The percentage of marsh spot in peas was reduced to 3%, after spraying with 1½% manganese sulphate at full bloom plus a spray at the end of flowering. Spraying before flowering was ineffective.—Inst. Bodemvrucht., Groningen.

1447. CARTER, M. V.
Chemical destruction of mature perithecia of *Mycosphaerella pinodes.*
Nature, 1959, **183**: 162-3, bibl. 5, illus.

In laboratory tests with heavily infected pea straw, momentary immersion in an emulsion of pentachlorophenol at concentrations down to 0·2% almost completely killed the ascospores in mature perithecia of *Mycosphaerella pinodes*. Spraying at 0·75% reduced the living ascospores to approximately 0·5% of those in control samples. Similar results were obtained in preliminary tests with 0·2% preparations of either dinitro-ortho-cresol or dinitro-secondary butyl-phenol. Field experiments in progress emphasize the difficulty of completely covering the plant surface by spraying.—Waite agric. Res. Inst., Adelaide.

1448. FRANSSEN, C. J. H.
Levenswijze en bestrijdingsmogelijkheden van de erwtetrips. **(Biology and control of pea thrips.)** [English summary 1 p.]
Landbouwvoorl., 1958, **15**: 271-9a, bibl. 8, illus., reprinted as *Meded. Inst. PlZiekt. Onderz.* **166**.

Adult *Kakothrips* generally do not attack horticultural varieties of peas which flower some time before their emergence. In infested areas early-flowering varieties should be sown at some distance from old pea fields. Control of newly-hatched larvae was obtained with insecticides containing parathion applied at a rate of 400 g. active ingredient per ha. Control with malathion, diazinon, chlorthion and DDT was less satisfactory.

1449. ANON.
A new, mobile pea harvester.
Fm Mechaniz., 1958, **10**: 457-8, illus.

This machine, by Mather & Platt Ltd., is designed to handle relatively immature pods with young and tender peas. The ribbon of vine passes in and out round a series of small roller beaters arranged cylindrically as a rotary drum: this has a number of advantages. The storage capacity is for about ½ ton of peas. The haulms may be left in heaps or spread by spinner as green manure as desired.

1450. ANON.
A combine harvester for green peas.
Fm Mechaniz., 1958, **10**: 347-9, illus.

A detailed perspective drawing and brief specification of the experimental McBain pea cutter and viner are accompanied by notes on its performance in the field. It is an engine-driven combine harvester pulled by a tractor, and its capacity under normal conditions is stated to be ½ acre per hour in a crop yielding 35–40 cwt. of vined peas per acre. It will be priced at £2,750 in the U.K.

1451. VODA, B.
Prodloužení uchovatelnosti zeleného hrášku. (**Prolonging the storage period of green peas.**) [Russian summary 1 p.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 893-908, bibl. 22.

Green peas of the varieties L2 and Lincoln stored best at 0° C.; 5° C. was less favourable and 20° C. unsatisfactory. At all temperatures peas in pods or on the vine stored better than shelled. The relative humidity of 65–70% used in these tests was found too low. The satisfactory storage period for shelled peas was 5–6 days at 0° C., 4–5 days at 5° and one day at 20° C. In pods the figures were 8–13, 6–8 and 2–4 days, and on the vine 8–13, 7–8 and 4–5 days respectively. Gas storage at 20% and 30% CO_2 or 0·2% SO_2 showed no great advantage. The L-ascorbic acid content declined under all storage conditions, the fall being smallest at 0° C. and greatest at 20° C. Determination of technical maturity was based on the alcohol-insoluble solids content together with other basic indicators of maturity.

1452. POST, J. J., AND GROENEWEGEN, J. H.
Feno-klimatologisch onderzoek aan stamslabonen. (**Pheno-climatological studies with dwarf beans.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1958, **21**: 495-502, 781-6, 854-60, bibl. 4, illus.

In studying the relationship between climatological and phenological data from bean plots throughout the Netherlands, temperature was shown to be the most important factor during the vegetative phase. Differences in growth due to rainfall were small.

1453. EL-SAMIA, M. A., EID, M. T., AND HASHISH, S.
Effect of soil texture and fertilizer treatment on phosphorus uptake by horse-beans using isotope P^{32}.
Agric. Res. Rev. Cairo, 1958, **36**: 284-8, bibl. 6.

Horse beans were grown in pots of soil of 4 different textures and supplied at planting time with 3 levels of superphosphate. Three weeks after germination P^{32} was supplied, and, 4 days later, the plants were examined using a GM counter. Most radioactive phosphorus was absorbed by plants growing in the lightest soil and by those plants which had received the highest previous P application. The effect of the previous P treatment was more pronounced with sandy soil than with loam or clay loam soil. Roots contained more P^{32} per unit weight than stems, and stems more than leaves.

1454. FEUCHT, J. R., AND WATSON, D. P.
The effect of gibberellins on internodal tissues of *Phaseolus vulgaris* L.
Amer. J. Bot., 1958, **45**: 520-2, bibl. 14, illus.

Seedlings of *Phaseolus vulgaris* L. were treated with 20 μg. of gibberellin using corresponding paired non-treated plants for comparison. Microscopic studies of the first and third internodes of plants 48 and 72 hrs after treatment indicated that application of gibberellins not only increased the length of internodes of the seedlings but also increased the number and length of cells. Although cell numbers were increased substantially in seedlings of *Phaseolus*, cell elongation was primarily responsible for the increase in internode length. [From authors' summary.]—Michigan St. Univ., East Lansing.

1455. GREULACH, V. A., AND HAESLOOP, J. G.
The influence of gibberellic acid on cell division and cell elongation in *Phaseolus vulgaris*.
Amer. J. Bot., 1958, **45**: 566-70, bibl. 24.

Four weeks after treatment the third internodes of bean (*Phaseolus vulgaris*) plants supplied with 0·346 mg. of gibberellic acid each and of the control plants were fixed for sectioning and anatomical measurements. This internode was selected because it both initiated and completed its growth during the experiment. Though the treated plants grew 1·96 times as tall as the controls, and had third internodes averaging 2·28 times as long, the mean longitudinal, radial and tangential diameters of cells from both the pith and the cortical parenchyma were not significantly different from those of the controls. The GA had no effect on the mean thickness of the tissues outside the pith, but the pith of the treated plants was significantly smaller in diameter than that of the controls (0·86 as great), resulting in significantly thinner stems. The volume of the treated pith, however, was 1·68 times that of the controls and the volume of the entire internodes averaged 1·70 times that of the controls. It is concluded that in this experiment growth promotion by GA involved only cell division and not cell elongation and that in the pith GA may also have influenced the plane of cell division. Along with other recent reports of stimulation of cell division by GA, these data suggest the need for re-evaluation of the earlier conclusions that GA growth promotion is due principally to cell enlargement. [Authors' summary.]—Univ. N. C., Chapel Hill.

1456. Biggs, R. H., and Leopold, A. C.
The two-phase action of auxin on abscission.
Amer. J. Bot., 1958, **45**: 547-51, bibl. 20.

From an examination of the effects of auxin on four types of bean explants the following conclusions have been drawn: (1) The primary action of auxin is directly on the abscission zone and is of the two-phase type with low concentrations accelerating abscission and high concentrations inhibiting it. (2) The differences between responses to proximal and distal applications of auxin can be explained on the basis of differences in transport, without the necessity of an auxin gradient involvement. [From authors' summary; see also *H.A.*, 28: 2084 and 29: 455.]—Purdue Univ., Lafayette, Indiana.

1457. Muzik, T. J., and Cruzado, H. J.
Differentiation of bean internode segments in tissue culture with added indoleacetic acid, 2,4-dichlorophenoxyacetic acid, and maleic hydrazide.
Bot. Gaz., 1958, **120**: 57-9, bibl. 12.

Internode segments of snapbeans (*Phaseolus vulgaris* L.) were placed under sterile conditions in nutrient agar containing MH, IAA or 2,4-D at concentrations of 0·1, 1·0, 10, and 100 p.p.m. Cambium and phloem tissues proliferated in the control segments and produced roots without the addition of growth-affecting substances. Anatomical changes were similar in the controls and in the various treatments. Low concentrations of IAA and 2,4-D limited the amount of callus but led to more roots. Low concentrations of MH stimulated both callus and root formation. MH at 1·0 p.p.m. induced ageotropic root growth. Callus and root formation were inhibited by 10 and 100 p.p.m. MH and by 2,4-D at 100 p.p.m. [Authors' summary.]

1458. Biddulph, S., Biddulph, O., and Cory, R.
Visual indications of upward movement of foliar-applied P^{32} and C^{14} in the phloem of the bean stem.
Amer. J. Bot., 1958, **45**: 648-52, bibl. 7, illus.

P^{32} was introduced into Red Kidney bean as a spray on the lower surface of the leaf. The path of its upward movement from the leaf was followed by means of microautoradiographs of stem sections taken from the internode between the 1st and 2nd trifoliate leaves. Movement of P^{32} occurred in the phloem tissue principally between leaves of the same orthostichy. C^{14} was supplied as $C^{14}O_2$ which was confined above the terminal leaflet of the first trifoliate leaf of the bean. Labeled photosynthate movement into the stem immediately below this node and into the internode between the 1st and 2nd trifoliate leaves was followed in the same manner as for P^{32}. Movement of C^{14} from the leaf both upward and downward in the stem occurred in the phloem tissue from which there was lateral movement into the xylem especially at higher stem levels. [Authors' summary.]—State Coll. Washington, Pullman.

1459. Stanković, D., and Bukovac, M.
Uticaj temperature i elemenata Na, B i Cu na apsorbovanje i kretanje fosfora kod mlade biljke pasulja. (**The effect of temperature and Na, B and Cu on the absorption and translocation of phosphorus in young bean plants.**) [English summary 1 p.]
Arh. poljopr. Nauk., 1958, **11** (33): 126-31, bibl. 4, illus.

P^{32} alone or in combination with Na, B or Cu was applied to the upper surface of one of the primary leaves of bean seedlings grown in Hoagland solution at 7, 15, 20 and 25° C. At 7° C. absorption and translocation were very slow; temperature optima for utilization of foliar applied P were between 20 and 25° C. Na, B and Cu used at 0·01 M and 0·001 M stimulated P absorption, the lower concentration being more effective. At first, the effect of Cu was greatest, but 96 hrs after treatment Na at 0·001 M induced the largest P uptake and translocation to all organs.

1460. Biddulph, O., and others.
Circulation patterns for phosphorus, sulfur and calcium in the bean plant.
Plant Physiol., 1958, **33**: 293-300, bibl. 29, illus.

The circulation patterns for P-32, S-35 and Ca-45 in the bean plant were determined, by radioautographic means, from single aliquots of tracer administered to the roots during a one-hour period. A portion of the radioactive isotope of phosphorus displayed sustained circulation throughout the plant during the whole of the 96-hour experimental period. The S-35 was originally mobile, but circulation was rapidly curtailed by metabolic capture in young leaves. The Ca-45 did not recirculate following its initial delivery via the transpiration stream. [Authors' summary.]—Stat. Coll. Wash., Pullman.

1461. Medvedev, Ž. A., and Zabolockij, N. N.
The use of electrophoresis and autoradiography in the study of nucleotide composition and phosphorus metabolism of nucleic acids in different organs of bean. [Russian, with English summary 8 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 3, pp. 207-14, bibl. 15.

Bean plants were grown in a nutrient solution with P^{32} added either from the start or 40 hrs before analysis. The nucleotides were separated by paper electrophoresis and determined spectrophotometrically and by radioactivity. No significant difference was found between the nucleotide fractions of RNA (ribonucleic acid) of the plastids and cytoplasm, nor between those from different organs, i.e. young and old leaves and roots.

1462. Osborne, D. J.
Changes in the distribution of pectin methylesterase across leaf abscission zones of *Phaseolus vulgaris*.
J. exp. Bot., 1958, **9**: 446-57, bibl. 17.

Determinations of pectin methylesterase in abscission zones and surrounding parts of *Phaseolus* leaves have shown a relatively high activity in young tissues, which decreases as the leaf grows older. The greatest fall occurs in the pulvinus. In nonsenescent leaves, the enzyme activity is higher in pulvini than elsewhere and there is a gradient of activity across the line of abscission from the pulvinus to the petiole or stem. During senescence this gradient falls, and it is generally reversed at abscission. Data suggest that the advent of abscission may be linked to the steepness of this gradient. If abscission of leaves or isolated abscission zones is accelerated by appropriate treatments there is a more rapid decrease in pectin methylesterase activity than in the controls, and a more rapid fall in the gradient across the line of abscission. If abscission is retarded the enzyme activity is sustained and the gradient is maintained or increased. The results are discussed in relation to the changes that may occur in the pectic constituents of cell walls during senescence and abscission, and in relation to some of the known effects of auxins on pectin metabolism. [Author's summary.]—A.R.C. Unit exp. Agron., Oxford.

1463. Mitchell, J. W., Smale, B. C., and Porter, F. M.
Effect of some substituted carbamates on symptom development in stems of bean plants infected with southern bean mosaic virus.
Phytopathology, 1958, **48**: 517-18, bibl. 2.

Among various esters of carbanilic acid and 2-methyl-5-chlorocarbanilic acid, only the furfuryl compounds suppressed symptom development of southern mosaic in Pinto beans. Several phenyl-ring substituents of isopropyl carbanilates were tested. The 2 esters which gave positive results were those of 2,4-dinitro-5-chloro- and 2,4-dinitrocarbanilic acids, causing respectively 99% and 88% symptom suppression. Further tests showed that the furfuryl ring had to be unsaturated for the compound to be effective.

1464. Herzmann, H.
Biochemische Untersuchungen über den Stoffwechsel gesunder und brennfleckenkranker Bohnen. I. Untersuchungen über Kohlenhydrate, Stickstoffverbindungen, Carbonsäuren und einige Oxydationsenzyme. II. Untersuchungen über sekundäre Pflanzenstoffe. (**Biochemical studies on the metabolism of healthy beans and of beans infected with anthracnose. I. Studies on carbohydrates, nitrogen compounds, carboxylic acids and certain oxidation enzymes. II. Studies on secondary plant substances.**) [English summaries ½ and ½ p. respectively.]
Phytopath. Z., 1958, **33**: 349-70, bibl. 35, and **34**: 109-36, bibl. 41, illus.

I. The leaves of diseased plants showed higher sugar and nitrogen contents, the rise being specially marked in the fraction of free amino acids. In infected fruits and stems, however, the amount of sugar and nitrogen compounds was less. No difference was observed between healthy and diseased leaves in the amounts of organic acids, but diseased fruits contained citric acid in addition to malic acid. The phenoloxidase and peroxidase activities underwent marked fluctuations during the growth period. There were 2 maxima, at the beginning and in the middle of the vegetative development respectively, with a minimum in between at the time of flowering. Diseased plants possess higher phenoloxidase and peroxidase activity in all stages of development. The ascorbic-acid oxidase activity undergoes similar variations, but in this case the diseased plants have a lower activity than the healthy plants. No correlation could be detected between catalase activity and infection. [Author's summary.]

II. Secondary substances in healthy and diseased leaves and fruits are discussed.—Inst. Phytopath. Aschersleben and Justus v. Liebig-Inst. organ. Chem., Martin-Luther Univ., Halle-Wittenberg.

1465. Steele, A. E., and Good, J. M.
Evaluation of several nematocides for control of sting nematodes on lima beans.
Plant Dis. Reptr, 1958, **42**: 1284-7, bibl. 13.

Sting nematode (*Belonolaimus gracilis*) populations in plots fumigated with a mixture of dichloropropene (DCP) and ethylene dibromide (EDB) or with 41% EDB or dibromochloropropane (DBCP) were reduced as compared with those in untreated plots, and remained low for 126 days. D-D or DCP kept populations low for 92 days. The highest yields of lima beans were obtained from plots treated with 41% EDB or the DCP-EDB mixture. —U.S.D.A., Nemat. Field Lab., Tifton, Georgia.

1466. Semel, M.
Tests for the control of *Tetranychus telarius* (L.) on lima beans.
J. econ. Ent., 1958, **51**: 735-7, bibl. 3.

In 3 years of field studies it was found that parathion and several other compounds, although toxic to the two-spotted spider mite, would not provide sufficient economical control where applications were started after high populations had become established. Three systemics, Thimet, Am. Cyanamid 12008 and demeton, were very effective. Two applications made a week apart, after the mites were established, were adequate for seasonal control. Other promising compounds were Kelthane, Hercules AC-528, Monsanto 8574, Trithion, Bayer 19639, ethion, Am. Cyanamid 18706 and Niagara 908. [From author's abstract.]—Long Is. Veg. Res. Fm.

1467. Apple, J. W., Strong, F. E., and Raffensperger, E. M.
Efficacy of insecticidal seed treatments against wireworms on lima beans and corn.
J. econ. Ent., 1958, **51**: 690-2, bibl. 7.

Seed treatment of lima beans resulted in 45% average mortality of *Limonius agonus* in the row 18 days after planting. At harvest there were average gains of 61·6% in stand and 36·4% in plant weight due to seed treatments. Lindane, dieldrin, heptachlor and aldrin were equally effective, no advantage being gained from using rates higher than 0·5 oz./100 lb. of seed.—Univ. Wisc., Madison.

Mushrooms.

1468. Block, S. S., Tsao, G., and Han, L.
Production of mushrooms from sawdust.
J. agric. Food Chem., 1958, **6**: 923-7, bibl. 20, illus.

This work was aimed at determining how effectively sawdust and other cellulosic wastes might serve as a medium for mushroom production. The commercial mushroom, *Agaricus campestris*, was cultivated on fortified, composted gum wood sawdust. The yields on a weight basis were considerably higher than commercial yields from horse manure compost. The wild, wood-rotting mushroom, *Pleurotus ostreatus*, was grown in 2 weeks on sterile sawdust medium fortified with oatmeal. On non-sterile, composted balsa wood sawdust the unusually high yield of 1·21 lb. of fresh mushrooms per lb. of dry sawdust was obtained. When fortified with soybean meal, the yield was 1·41 lb. In all experiments the yields on a per square foot basis were low, because of the low bulk density of the sawdust. [Authors' abstract.] *P. ostreatus* has a tough, inedible stem, but its cap resembles *A. campestris* in flavour and could be of value as a flavouring ingredient for soups, etc.—Univ. Fla, Gainesville.

1469. Fraser, I. M., and Fujikawa, B. S.
The growth-promoting effect of several amino acids on the common cultivated mushroom, *Agaricus bisporus*.
Mycologia, 1958, **50**: 538-49, bibl. 17.

The amino acids phenylalanine, methionine and proline have been found to promote the growth of several strains of the common cultivated mushroom, *Agaricus bisporus*, to varying degrees. Phenylalanine and methionine were the most active for two strains, while phenylalanine and proline were the most active for the other strain tested. The presence of thiamine was necessary for an appreciable growth response to these amino acids. Approximately optimal levels for the glucose, asparagine and inorganic salts present in the medium have been determined in relation to the growth response to the amino-acid-vitamin mixture. [Authors' summary.]—Coll. med. Evangelists, Loma Linda, Calif.

1470. Hughes, D. H., Lynch, D. L., and Somers, G. F.
Chromatographic identification of the amino acids and carbohydrates in the cultivated mushroom *Agaricus campestris* L. ex-Fries.
J. agric. Food Chem., 1958, **6**: 850-3, bibl. 16.

Twenty-seven ninhydrin reacting substances, including eight essential amino acids, as well as 17 carbohydrates were present. A polyhydric alcohol, mannitol, was present in relatively large quantity. A modification of the method of Bradfield and Flood, in which polyhydric alcohols fluoresce under ultraviolet light, is suggested as a sensitive method for detecting these compounds. The hexoses, glucose and galactose, were present in amounts comparable to mannitol. The intensity of spots on paper chromatograms demonstrated that the tyrosine content progressively decreased through the first, third, and fifth crops. The ease of enzymatic discoloration correlates with the levels of tyrosine in the three crops. [From authors' summary.]—Univ. Delaware, Newark.

1471. Hussey, N. W.
Control of flying insects in mushroom houses.
Mushroom Grs' Ass. Bull., 1958, No. 105, pp. 362-4.

The control of phorids, sciarids and cecids is discussed, and it is concluded that almost all insecticidal effort should be applied during the period immediately following spawning. Insecticides should be put in the compost at the last turn, and, during spraying and smoking, special attention should be given to the bed surface.

Onions and allied crops.

(*See also* 1377, 1391, 1553h.)

1472. Mazzini, C.
Norme colturali per la produzione di seme di cipolla in Italia. (**Cultural rules for production of onion seed in Italy.**) [English and German summaries 2 lines each.]
Sementi elette, 1958, **4** (5): 38-45, illus.

Soil requirements, rotation, mixed cropping, tillage, manuring according to soil texture, planting, earthing up, staking or other methods of support, harvesting and cleaning the seed, and control of downy mildew.

1473. Cavia, C. E., and Crnko, J.
Tres nuevas variedades de cebolla tipo Valenciana. **(Three new onion varieties of the Valenciana type.)**
Idia, 1958, No. 127, pp. 9-17, bibl. 11, illus.

The new varieties maintain the good qualities of Valenciana and are superior to it in not flowering prematurely, producing a very low percentage of immature bulbs at harvest time, retaining the outer skins, and being more resistant to injury and storage rots.

1474. Marlatt, R. B., and McKittrick, R. T.
Pink-root resistant onions for Arizona.
Plant Dis. Reptr, 1958, **42**: 1310-11, bibl. 7.

During 4 years, 8 varieties of early onions were grown in irrigated desert soil infested with *Pyrenochaeta terrestris*. The varieties Crystal Wax, L690, and Texas Hybrid 23 were eliminated as unsatisfactory. Granex yielded significantly better than Texas Hybrid 28, Excel, L365 and Eclipse, despite the fact that it showed more pink root. Granex also stored significantly better than the other varieties, at temperatures ranging from 75° to 85° F. [From authors' abstract.]—Ariz. agric. Exp. Stat., Mesa.

1475. Devočkin, F. A.
Growing set and bulb onions in one year by mulching the seed beds with paper. [Russian.]
Dokl. Mosk. s.-h. Akad. im. K. A. Timiryazeva, 1957, No. 28, pp. 332-7, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,647.

By this treatment the weed population was reduced, the temperature and water regime of the soil improved and the number of nitrifying bacteria and the content of nitrate N greatly increased. The yield of sets was increased by 45%, and that of bulbs by 11·6%.

1476. Itagi, T., Hiki, M., and Ito, H.
Studies on the fertilization of onion. [Japanese, with English summary ½ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 49-56, bibl. 20, illus.

In experiments carried out during 1954-57 the best onion seedlings were obtained when a complete fertilizer was mixed with the top 15 cm. of soil. Growth and yield were correlated with N applications and root development with P applications. Seed germination was low when fertilizers were mixed with the top 2 cm. of soil. Seedlings which were over-developed in the seedbed did not grow well when transplanted. Compost worked into the ground before the bulbs were transplanted did not increase growth. P appeared to be more essential than N or K for good growth. Additional fertilizer applications increased growth when they were applied before mid-March. J.R.L.

1477. Šifrina, H.
The chemical composition of bulb onions in Moldavia [Russian.]
Zemledelie i Životnovodstvo Moldavii, 1957, No. 5, pp. 72-3, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,852.

A study of 12 varieties of onion (*Allium cepa*) showed that the salad group had low dry matter (9–12 g./100 g.) and sucrose (45–55% of total sugars) contents, while the pungent varieties contained 15–21 g. and 75–92% respectively. The chemical composition remained constant from year to year. The pungent varieties stored better and, during frying, retained a high percentage of sugars (85%) and vitamin C (up to 50%).

1478. Skudnaja, O. D.
The accumulation of pigments and the growth of onions under fluorescent light in the glasshouse. [Russian.]
Uč. zap. Brestsk. gos. ped. In-t. 1956, No. 1, pp. 51-61, from *Ref. Z.* (*Biol.*), 1958, No. 1, Abstr. 1,617.

Dry matter, chlorophyll and carotene accumulations were studied in the leaves of 5 varieties of onion grown under different regimes of supplementary illumination. With the variety Strigunovskij the greatest dry matter increment and pigment accumulation occurred with 9 hrs additional daily illumination. Increasing the light intensity from 2,500 to 10,000 lux increased chlorophyll and carotene contents up to 10·037 and 0·559 g. per kg. dry weight of the leaves respectively. Some varieties were more responsive to artificial illumination than others. Continuous illumination also improved growth and pigmentation.

1479. Szirmai, J.
Vírusveszély a makói hagymatemesztésben. **(A virus threat to the Mako onion crop.)** [English and Russian summaries ½ p. each.]
Növénytermelés, 1958, 7: 63-72, bibl. 8, illus.

Damage caused by yellow dwarf virus and transmission tests are described. For control, prevention of mechanical injury, spraying against aphids and breeding for resistance are recommended.

1480. Lewis, G. D., and Mai, W. F.
Chemical control of *Ditylenchus dipsaci* (Kühn) Filipjev in organic soils of southern New York.
Plant Dis. Reptr, 1958, **42**: 1360-3, bibl. 11.

Excellent control of *Ditylenchus* in organic onion soils was obtained by fumigation with DD at rates of 50 gal. per acre or higher. No infected onions have been found in the fields for 2 years, and no plant injury has been observed even with rates of 110 gal. per acre.—Cornell Univ., Ithaca, N.Y.

1481. PERRON, J. P., JASMIN, J. J., AND LAFRANCE, J.
Varietal resistance of seeded onions to the onion maggot, *Hylemya antiqua* (Meig.) (Diptera: Anthomyiidae).
Canad. Ent., 1958, **90**: 653-6, bibl. 4.

In field and greenhouse tests carried out over 3 years in Quebec 44 onion varieties were tested for resistance to *Hylemya* [*Delia*] *antiqua* using Early Yellow Globe as a standard. Varieties of *Allium fistulosum*, typified by Nebuka and Hishiko, were significantly more resistant than Beltsville Bunching (*A. cepa* × *A. fistulosum*) or than any of the varieties of *A. cepa* tested.

1482. MATARRITA ACUNÃ, A., AND DE LEON ROJAS, A.
Eficiência de diversos inseticidas orgânicos fosforados para o contrôle do tripes da cebolla. **(Effectiveness of various organic phosphorus insecticides for control of onion thrips.)**
Biológico, 1958, **24**: 134-6, bibl. 1.

Onion plants infested with thrips were sprayed twice, with a 9-day interval, using either 0·07% chlorthion, 0·1% diazinon or 0·07% malathion. All 3 insecticides greatly reduced the infestation, but malathion was considerably less persistent than the others. Crop yields were increased 39% by chlorthion, 38% by diazinon and 15% by malathion.

1483. MANN, L. K., AND MINGES, P. A.
Growth and bulbing of garlic (*Allium sativum* L.) in response to storage temperature of planting stocks, day length, and planting date.
Hilgardia, 1958, **27**: 385-419, bibl. 7, illus.

Dormancy in California Late garlic bulbs is most rapidly broken in storage at 5° or 10° C., and sprouting after such storage is quicker and more vigorous than at higher or lower temperatures. Plants grown from cloves stored at 0° or 20° C. had narrow leaves and thin false stems, while those stored at intermediate temperatures, e.g. 10° C., had thick stems and broad leaves. Bulbs were formed most quickly after storage at 0° or 5° C.; plants never exposed to temperatures below 20° C. may fail to form bulbs even in a favourable day length. Time of maturity tended to be uniform, even from widely separated planting dates, but maturity may be delayed if plants receive little exposure to low temperature. The percentage of rough bulbs (having large exterior cloves with few or no dry leaf bases surrounding them) was increased after long periods of low-temperature storage. Roughness decreased with delayed planting. Most of the temperature responses of garlic appeared to be reversible, but there was little response to controlled temperatures during storage periods of less than one month. Dry matter content of the bulbs showed little variation except under conditions when maturity was delayed, when solids content was low. Bulb weight generally decreased with delay in planting.

1484. COUTO, F. A. A.
Sintomas de deficiência mineral em alho. **(Mineral deficiency symptoms in garlic.)** [English summary 7 lines.]
Rev. Ceres, 1958, **10**: 402-12, bibl. 9, illus.

Central buds dissected from garlic bulbs, as well as whole bulbs, were grown in sand cultures with N, P and K at 0, normal and twice normal Hoagland levels; Ca, Mg and B at 0, $\frac{1}{4}$ normal and normal levels; and Zn either normal or absent. Deficiency symptoms are described. The plants without Zn were not visibly affected but they matured slightly earlier than the controls. Plants derived from buds were less vigorous, and (except with B) showed deficiency symptoms earlier, than those from whole bulbs. Doubling the supply of any major element, or reducing B, Mg or Ca to $\frac{1}{4}$ of normal, produced little or no effect, except that 4 of the 10 low-Ca plants from whole bulbs developed foliar symptoms.

1485. KNOBLAUCH, F.
Forsøg med praeparering af skalotteløg til laeggebrug. **(Experiments on the preparation of shallot sets.)** [English summary 1 p.]
Tidsskr. Planteavl, 1958, **62**: 693-717, bibl. 11.

Storing shallot sets during January and February at temperatures of 20°, 25°, 30° and 35° C. and at a relative humidity of 75% increased yields by 48, 54, 59 and 14% respectively over those of controls kept at 5–10° C. In later storage trials at 30° C. even greater yield increases were obtained when the relative humidity was raised to 95% to reduce losses and to improve quality. The warm storage also resulted in an extension of the growing season by 2–3 weeks and in a partial suppression of bolting. The quality of bulbs from warm-stored shallots was good, but they tended to assume a tall shape if small and to split if large. There were certain advantages in cold treatment at about 10° C., and preliminary experiments point to a combination of cold and warm storage at different times as the most promising development in the future.

1486. LUNDSTEIN, A. S., AND KNOBLAUCH, F.
Varmtvandsbehandling af skalotteløg til laeggebrug. **(Warm water treatment of shallot sets.)** [English summary 13 lines.]
Tidsskr. Planteavl, 1958, **62**: 718-26, bibl. 1.

Of the various water temperatures, periods of immersion, methods of cooling and times of application tested, the best results were obtained from immersing the sets for 2 hours in water at 43·5° C. followed by rapid cooling in cold water. This treatment, carried out immediately before planting, raised shallot yields from 293·8 kg. to 323·5 kg. per 100 sq. m. Bolting and primary infections of downy mildew were also controlled.—Hornum Exp. Stat.

1487. Knoblauch, F.
Kvaelstofgødningsforsøg med skalotteløg 1948-1954. **(Experiments on nitrogen manuring of shallots, 1948-54.)** [English summary 22 lines.]
Tidsskr. Planteavl, 1958, **62**: 670-6, bibl. 3.

In a light, sandy loam, well-supplied with P and K, applications of 400–600 kg./ha. calcium nitrate at the time of planting considerably increased the yield of shallots. However, the increase due to N was lost in storage as a result of the greater susceptibility of the shallots to *Botrytis allii*. Artificial drying of the shallots at 40° C. immediately after harvesting greatly improved their keeping quality.

1488. Knoblauch, F.
Tørringsforsøg med skalotteløg. **(Drying experiments with shallots.)** [English summary 1 p.]
Tidsskr. Planteavl, 1958, **62**: 677-92, bibl. 3.

When dried artificially at 40° C. after lifting and kept from October to April at 5–10° C., 77% of the bulbs remained healthy, as against 39% for field-dried plants. Immediately after lifting shallots needed 4–6 days at 40° C. for artificial drying. Bulbs left in the field for 2 weeks required a shorter drying period, but this treatment was less effective against diseases. If the crop was sprayed with zineb a few days before harvest, sulfo spreaders were shown to accelerate, and plastic spreaders to prolong, the drying period. Susceptibility to *Botrytis allii* depended largely on manuring [see abstract 1487] and on the growing season. A temperature of 5–10° C. for air-cooled storage was adequate for artificially dried shallots, whereas field-dried bulbs required about 0° C. for better keeping. Artificial drying had the additional advantage of controlling downy mildew (*Peronospora destructor*) and of producing bulbs of a higher commercial value than field-drying. It was also found desirable to maintain a constant temperature during the whole storage period.

Rhubarb.

(*See also* 1077o.)

1489. Forest, B.
Acidity of rhubarb petioles as influenced by stage of maturity, season and partial shading.
Canad. J. Plant Sci., 1958, **38**: 387-93, bibl. 23.

Younger petioles were more acid than older ones. The soluble K content increased as the petioles aged. In general, the acid content was low at the start of the harvesting period but was significantly higher at the end. Petioles grown in full sunshine were more acid than those grown in partial shade.—Canada Dep. Agric., Quebec.

1490. Murakishi, H. H., and Potter, H. S.
Fungicidal control of *Botrytis* leaf rot of hothouse rhubarb.
Plant Dis. Reptr, 1958, **42**: 1316-18, bibl. 2, illus.

Seven fungicides were sprayed at weekly intervals on rhubarb from the start of forcing until the end of harvesting. All treatments significantly reduced infection from *Botrytis cinerea*, Phaltan 50–W at 2 lb. per 100 gal. giving the best control.—Mich. agric. Exp. Stat.

Root crops.

(*See also* 1046, 1377, 1552h, l, m, z.)

1491. Margara, J.
Sur la dévernalisation de bourgeons de la tige chez des espèces du genre *Beta*. **(Devernalization of stem buds in some species of *Beta*.)**
Reprinted from *C.R. Acad. Sci. Paris*, 1958, **246**: 145-7, bibl. 5.

Buds on the aerial stem of *Beta maritima*, *B. trigyna* and the F_4 hybrid of *B. vulgaris*×*B. lomatogona* were devernalized by short-day treatment, most of them producing rosettes. Supplementary night lighting in spring and summer in the open induced the production of inflorescences, even with repeated cutting as new branches developed. In the greenhouse, with or without supplementary light, the buds below the 5th internode formed vegetative rosettes and the upper ones inflorescences. Topping of plants in the open during spring generally resulted in the formation of flowering stems from the base of the main inflorescence axis, but, when carried out in autumn, these basal buds formed foliar rosettes. Cuttings taken at medium height from the stem sometimes formed inflorescences, but those from the base always formed vegetative rosettes. The results appear to apply to those species and varieties of *Beta* for which vernalization and day-length are obligatory, but not to those, such as *B. patellaris*, which are indifferent.

1492. Harrison, D. E.
Downy mildew of beet in Victoria.
J. Agric. Vict., 1958, **56**: 675-7, bibl. 7, illus.

Suggested control measures against the disease, caused by *Peronospora schachtii*, are field sanitation and spraying 4: 4: 40 bordeaux at 7–10 day intervals.

1493. Kružilin, A. S., and Švedskaja, Z. M.
Vernalization of isolated buds of biennial plants in sugar solutions. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **121**: 561-4, bibl. 7, illus.

Apical buds of carrots were detached with a fragment of root and vernalized in the dark at 1–2° C. for 60 days on 2% sucrose, 5% sucrose or glucose and on distilled water to which minerals were added. The buds vernalized on the sugar solutions produced flower stems after transplanting while those on water did not. [For earlier work see *H.A.*, 28: 1473 and 1474.]

1494. (Wright, D. W.)
Build-up dangers with latest carrot fly control methods.
Comm. Gr, 1959, No. 3290, p. 161.

Broadcast applications of dieldrin dusts on a humus-rich soil at 2 lb. and 4 lb. per acre, followed by rotavation to 4 in. gave 95% control of carrot fly over 3 years. In mineral soils $\frac{3}{4}$ lb. dieldrin was adequate. Dieldrin sprays (at 40 gal. per acre) were also successful, but should be applied when the soil surface is dry. Parsnips and celery were also protected by dieldrin sprays. [In the discussion the dangers of carrot root eelworm and of aldrin and dieldrin accumulation in treated soil are mentioned.]—Nat. Veg. Res. Stat., Wellesbourne.

1495. Mukula, J.
Porkkanan talvisäilytys. (**Winter storage of carrots.**) [English summary 5 lines.]
Puutarha, 1958, **61**: 480-2, illus.

Storage rots of carrots, due mainly to species of *Stemphylium* and *Fusarium*, were successfully controlled by Fusarex Plus (a product containing 3% TCNB and 1% IPC) used at 500 g. per 100 kg. of roots. The same treatment checked sprouting, provided the storage temperature was below 6° C. [See also *H.A.*, 28: 1475.]

1496. Chakravarti, S. C.
Gibberellic acid and vernalization.
Nature, 1958, **182**: 1612-13, bibl. 6.

Seed treatments of *Brassica campestris*, *Cicer arietinum* and *Lens esculenta* with GA failed to produce earliness in flowering. Application of GA to growing plants was effective in inducing earliness only with *Brassica*, but less so than chilling. The experiments described confirmed the view that the primary effect of GA is on stem growth, flower formation being brought about indirectly.—Govt Hamidia Coll., Bhopal.

1497. Lister, R. M.
Some turnip viruses in Scotland and their effect on yield.
Plant Path., 1958, 7: 144-6, bibl. 3.

Inoculation of yellow turnips at the 6–8 leaf stage with strains of turnip crinkle and turnip yellow mosaic viruses had little effect on root yields, despite drastic effects on the leaves. In glasshouse tests it was shown, however, that earlier virus infection by flea-beetles may kill or severely damage turnip seedlings.—Scot. hort. Res. Inst., Mylnefield.

1498. Garber, E. D.
Further data on the concentration of free histidine of turnip varieties and their response to inoculation with histidine-requiring mutants of *Erwinia aroideae*.
Amer. J. Bot., 1958, **45**: 523-5, bibl. 5.

The resistance or susceptibility of individual fleshy storage organs from 12 plants of three turnip varieties to three histidine-requiring mutants of *Erwinia aroideae* and the free histidine concentration of each organ was determined. The pattern of resistance and susceptibility of the varieties differed in the 1956 and 1957 crops. The mean concentration of histidine of each variety also differed in the two crops. The difference in the pattern of resistance and susceptibility and in the mean concentration of histidine were assumed to be the result of environmental (non-genetic) factors. The nature of the resistance of plants with apparently adequate concentrations of histidine for the proliferation and metabolism of the mutants was briefly discussed. [Author's summary.]—Univ. Chicago, Ill.

1499. Moreton, B. D., Light, W. I. St. G., and John, M. E.
Control of cabbage root fly and other pests of late-sown turnips.
Plant Path., 1958, **7**: 130.

In August-sown turnips, a 0·1% dieldrin spray applied at the beginning of October gave the best yield of clean turnips and the greatest reduction of pest damage. Seed dressing with BHC gave a much lower degree of control, while aldrin soil treatment and dieldrin seed dressing were ineffective.—N.A.A.S., Wye, Kent.

Salad crops.

(*See also* 1077r, 1523, 1552b, r, s.)

1500. Canham, A. E.
Lettuce varieties for soil-warmed hotbeds.
Tech. Rep. electric. Res. Ass. **W/T35**, 1958, pp. 8, 9s.

Quality, size and earliness of 10 lettuce varieties in soil-warmed hotbeds were studied during several seasons. Three varieties proved to be suitable alternatives to Gotte à Forcer, viz. Gotte à Graine Blanche, Cheshunt Early Ball and Cheshunt 5b.

1501. Ogawara, K., and Ono, K.
Studies on the germination of lettuce seeds. 1. Inducing light-sensitivity in non-dormant light-insensitive lettuce seeds. [Japanese, with English summary 39 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 106-11, bibl. 11.

Light sensitivity was found to be induced by coumarin but not by its derivatives. Further, it was found that germination of seeds treated with the growth substances 2,4-D and IAA was inhibited by light, but that treatment with cis-cinnamic acid had no such effect. Again seeds treated at 50° C. for 5 hours showed poor germination, but this heat injury effect was partially removed by illumination immediately afterwards. This fact led to a study of the effect of various enzymatic inhibitors (KCN, NaF, monoiodacetic acid and phenylurethane) but only KCN and phenylurethane induced light sensitivity. Seeds treated with KCN germinated better in light than darkness but those treated with phenylurethane showed an inverse relation. Pre-chilling the seeds at 0° C. for 4 days resulted in a great improvement in the poor germination resulting from treatment with coumarin, KCN, 2,4-D and phenylurethane, though their induced light sensitivity remained unaltered.

1502. Klein, S., and Preiss, J. W.
Depth controlled deuteron irradiation of *Lactuca sativa* seeds. I. Effects on germination and growth.
Plant Physiol., 1958, **33**: 321-5, bibl. 15.

Irradiation of the coats and the endosperm alone increases the germination of the seeds in the dark. Deeper irradiation into the embryo moderates the dose requirements for germination. Root length inhibition occurred only when the embryo itself was irradiated. The energy requirement for root inhibition was found to be inversely related to depth of penetration in the embryo. With small but deeply penetrating doses root length was inhibited without changing the germination pattern. The effect of red light on germination could not be influenced by irradiation. From this it was concluded that the primary photo-receptor was a relatively small molecule. The deuteron induced dark-germination is not reversible by far-red light. A red pigment diffusing from the seedling after irradiation is described, as well as other radiation responses. [From authors' summary.]—Yale Univ., New Haven, Conn.

1503. Preiss, J. W., and Klein, S.
Depth controlled deuteron irradiation of *Lactuca sativa* seeds. II. Energy loss in the outer seed layers.
Plant Physiol., 1958, **33**: 326-9, bibl. 4.

Low energy deuterons were used as probes to establish which morphological entities of the lettuce seed are responsible for ionization-induced germination. For this purpose, the deuteron retarding ability of the fruit coat and seed coat+endosperm was measured with a range cell. Bragg curves for irradiations at various deuteron energies were constructed. It was found that it is *necessary* and *sufficient* to irradiate the endosperm to overcome the dark dormancy of lettuce seeds. [Authors' summary.]—Yale Univ., New Haven, Conn.

1504. Mayer, A. M., Poljakoff-Mayber, A., and Zacks, S.
The effect of diethylthiourea on the stimulation of germination and the inhibition of growth by thiourea.
Phyton, 1958, **11**: 23-8, bibl. 4.

Lettuce seed germination was stimulated by thiourea and inhibited by diethylthiourea, so that the percentage germination was a result of the opposing action of the 2 compounds. In growth both substances were inhibitory, but when the 2 substances acted jointly the resulting inhibition of root and hypocotyl growth was lower than expected from their independent actions.—Hebrew Univ., Jerusalem.

1505. Krickl, M.
Sommersalat. **(Summer lettuce.)**
Saatgut-Wirtsch., 1958, **10**: 332-5, bibl. 4.

A seed crop of summer lettuce may be successfully grown in Austria by using selected seed and by sowing after 20 April. The number of days to marketing and to bolting are given for several varieties.—Höh. Bundeslehr- u. Versuchsanst. Gartenb., Schönbrunn.

1506. Way, J. M.
Controlling *Botrytis* in lettuce.
Grower, 1959, **51**: 222-5.

TCNB and PCNB were compared with thiram and captan in various forms and combinations for the control of *Botrytis* in overwintered frame and field lettuce crops. In the frame lettuce a pre-planting soil application of TCNB (¾ oz. 5% TCNB per dutch light), followed by thiram sprays at 0·33% from early January at 21-day intervals, were most effective in reducing loss. With the field crop the fungicides were applied to the seedlings before planting out, and thiram (0·33%) and captan (0·25%) sprays were the most effective.—Nat. Veg. Res. Stat., Wellesbourne.

1507. (Bevan, J.)
Successful control of lettuce root aphis.
Comm. Gr, 1959, No. 3290, p. 164.

Diazinon, applied in two sprays at the rate of 1 pint 20% miscible diazinon in 100 gal. water per acre, has given consistently good control of lettuce root aphis [*Pemphigus bursarius*]. The first spray should be applied in late June, followed by a second spray after an interval of 10 days.

1508. Tilkin, V. E.
Le cycle de croissance de la chicorée-witloof. **(The cycle of development in witloof chicory.)**
Bull. hort. Liège, 1959, **14**: 8-12.

It was shown that both the vegetative and generative years could be divided into 4 typical stages of growth. In the first year differences were based on the state of the foliage, and especially on leaf number. During the second year development of the organs followed a sigmoid curve. Correlations were found between leaf number and leaf weight, between weights of leaves and roots, and between the diameter of the collar and weight of the roots. Observations showed that the largest leaves (8th to 16th) were the most characteristic. In a study of leaf morphology lobing and hairiness were not related to each other, but each was related to crinkliness. Plants with crinkled leaves were heavier than those with smooth leaves by about 25%. Leaf number of plants with lobed leaves was about 10% greater than that of plants with non-lobed leaves.—Stat. Rech. Ét. Amél. Plant. fruit. maraîch., Grand-Manil.

1509. WINTER, E.
Bildung eines roten Farbstoffes in verletztem Pflanzengewebe. (**The formation of a red pigment in injured plant tissue.**)
Planta, 1958, **52**: 187-94, bibl. 9.

Intybin was studied mainly in the leaves of *Cichorium endivia*, also in other parts of the plant and in *C. intybus*, *Lactuca sativa*, *Scorzonera hispanica*, and *Dahlia variabilis*.—BundesforschAnst. f. Lebensmittelfrischhalt., Karlsruhe.

1510. VAN DEN BRUEL, W. E., AND MOENS, R.
Essais de destruction d'un mollusque pulmoné aquatique: *Limnaea* (*Radix*) *peregra* O. F. Müller, dans les cressonnières. (**Tests for controlling the fresh-water snail *Limnaea peregra* in water-cress beds.**) [English summary ¼ p.]
Parasitica, 1957, **13**: 97-116, bibl. 9.

The most effective material for the control of *Limnaea* in the laboratory and in water-cress beds was isochlorthion at 1 c.c. active ingredient per sq. m. Chlorthion had a similar effect. Gusathion was effective in laboratory tests, but has high mammalian toxicity. Allethrin was less effective, and copper sulphate was not satisfactory.—Stat. Ent. État, Gembloux. [Omitted in error from *H.A.*, 28 (1).]

1511. VAN DEN BRUEL, W. E., AND MOENS, R.
Nouvelles observations sur la destruction des Limnaeidae dans les cressonnières. (**Further observations on the control of aquatic snails in water-cress beds.**) [English summary ¾ p.]
Parasitica, 1958, **14**: 89-106, bibl. 1.

Control of freshwater snails by isochlorthion varied according to species. *Limnaea peregra* at an early stage was fairly resistant to isochlorthion. The treatment previously recommended [see preceding abstract] is suitable at moderate temperatures, but in cold weather, with the possibility of night frost, the concentration should be increased by 300%, and the water flow stopped for 24 hours instead of for 2–3 days. The addition of isochlorthion to running water is not satisfactory as the duration of action of the chemical is too brief. Dipping cuttings in isochlorthion will reduce the snail population in new beds.—Stat. Ent. État, Gembloux.

Spinach.

(*See also* 1030, 1383, 1390.)

1512. SCHUPHAN, W., AND WEINMANN, I.
Der Oxalsäuregehalt des Spinates (*Spinacia oleracea* L.) als Masstab für seinen Wert als Nahrungsmittel. (**The oxalic-acid content of spinach (*Spinacia oleracea*) as a criterion of its value as a food.**) [English summary ¾ p.]
Qual. Plant. Maveg., 1958, **5**: 1-22, bibl. 44.

Analysis figures are given for N, protein, amino acids, nitrate, saponin, oxalic acid, total acid, vitamin C, sugars, chlorophyll, carotene, K, Na, Ca, Mg, Fe, P, S and Cl in spinach. Contents of Ca and of total and physiologically active oxalic acid are listed for 18 vegetables and 10 fruits. The average content of harmful oxalic acid in spinach is 400 mg. per 100 g. (fresh weight), and, under certain conditions of climate and manuring, the content may reach 1,500 mg. per 100 g. In general, sufficient Ca is included in normal diet to counteract possible harm from this acid when spinach is eaten. The factors affecting the oxalic-acid content of spinach are discussed.—Bundesanst. Qual-Forsch. pfl. Erzeugn., Geisenheim/Rheingau.

Tomatoes and other Solanaceae.

(*See also* 1020, 1030, 1049, 1056, 1058, 1059, 1118, 1119, 1379, 1381, 1384, 1385, 1391, 1552a, c, i, n, p, q, u, w, 1553b, e, k, 1573.)

1513. LESLEY, J. W., LESLEY, M. M., AND TURRELL, F. M.
Cytogenetic and pigment studies of a blue-green mutant from P^{32}-treated seeds of the tomato.
Amer. J. Bot., 1958, **45**: 598-602, bibl. 18, illus.

A fruitful dark-green (blue-green) mutant of a pure line of "Canary Export" variety of tomato was produced by β-particle absorption. It behaved as a simple recessive mutant, and under field conditions produced leaves containing higher concentrations of chlorophylls *a* and *b* than the normal green parent, and redder fruit when grown under greenhouse conditions. [From authors' summary.]—Univ. Calif. Citrus Exp. Stat., Riverside.

1514. NAZAROV, S. P.
An experiment on vegetative hybridization of tomatoes. [Russian.]
Selekcija i Semenovodstvo, 1957, No. 3, p. 80, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,838.

A growing fruit of the tomato variety Željtyj limonovidnyj [Yellow Lemon] was injected with the juice from a fruit of Humbert, and among changes noted in the progeny was the occurrence, in the F_3 generation, of red, orange, and mottled fruits.

1515. Georgieva, R.
Grafting wilted plants to obtain vegetative hybrids. [Russian.]
Agrobiologija, 1958, No. 5, pp. 29-38, illus.

Bulgarian work is described showing that by grafting wilted tomato scions on *Cyphomandra betacea* rootstocks the effects of the stock upon the scion were intensified. Changes were noted in the morphology, composition and biology of the grafted plants and their progeny.

1516. Lanckow, J.
Betrachtungen über den Zeitpunkt des Pikierens von Gemüsepflanzen. **(Observations on the time of pricking out vegetables.)**
Dtsch. Gartenb., 1958, **5**: 263-4, bibl. 3, illus.

Tomato seedlings should be pricked out as soon as possible after germination, when the cotyledons become horizontal. Development of young plants was poor when pricking out was delayed until 5 weeks from sowing.—Inst. Gartenb., Grossbeeren.

1517. Ministry of Agriculture, Belfast.
The artificial illumination of tomatoes at Loughgall Horticultural Centre.
Mon. agric. Rep. Minist. Agric. Belfast, 1958, **33**: 236-8.

Young Ware Cross plants, which were illuminated during early growth, yielded ¾ lb. more per plant than non-illuminated plants. The cost of lighting for 3 weeks was 4d. per plant. Tomatoes require at least 6 hrs darkness per day; the lamps were used for 12 hrs daily to augment natural lighting. Strict control of excessive temperatures due to the lamps should be maintained.

1518. Doyle, J. J., and MacLean, A. A.
The effect of soil aggregate size on availability of oxygen and on growth of tomatoes.
Canad. J. Soil Sci., 1958, **38**: 143-6, bibl. 13.

Diffusion of oxygen was measured by the platinum micro-electrode method on 7 sizes of artificially prepared soil aggregates. Diffusion of oxygen was directly proportional to aggregate size. Growth of tomato plants increased with aggregate size and with diffusion rate of oxygen. For a temperature of 68° F., and with the surface of the soil at a moisture tension of 20 cm., critical diffusion rates of oxygen are suggested for the 2-, 4- and 6-inch depths of 12×10^{-7}, 8×10^{-7} and 6×10^{-7} g./cm^2/min., respectively. [From authors' abstract. See also *H.A.*, 28: 3765.]—Canada Dep. Agric., Fredericton, N.B.

1519. Cervato, A.
Esperienze di concimazione del pomodoro da conserva. **(Fertilizer experiments with canning tomatoes.)**
Ital. agric., 1958, **95**: 721-33, bibl. 28, illus.

The rather sandy soil was comparatively rich in available K, but yields of marketable tomatoes were significantly and economically increased by applying potassium sulphate at 200 kg./ha. to the seedbed, in addition to 30 tons of farmyard manure (incorporated the previous autumn) and 600 kg. of superphosphate. Doubling the K application gave a further economic increase in the first, but not in the second season, when the experiment was repeated on adjacent and similar plots. The fruit ripened earlier as a result of K application. Half the plants of each series received inorganic N as 200 kg./ha. ammonium sulphate at sowing and 100 kg./ha. calcium nitrate when flowering began. With the N plus high K treatment a K/N antagonism was evident, and the insignificant yield increase was highly uneconomic. The lower K rate plus N gave a slightly lower yield than that from either rate of K alone. N without K was distinctly less satisfactory than all treatments except N plus high K.

1520. Malcolm, J. L.
Phosphorus experiments with tomatoes on Perrine marl.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 219-25, bibl. 4.

In this soil only a small amount of P becomes available at a relatively constant rate each year. The most efficient rate of application for tomatoes was 70–75 lb. of added P_2O_5 per acre per year. There was no evidence of harmful accumulation of phosphorus. Leaf contents of N and K decreased and of P increased as the rate of P application increased. No effect of P on Ca or Mg content of leaves was apparent. A N: P ratio of 12·5: 1 is suggested as the optimum. No foliage symptoms which could be used in deficiency diagnosis were observed.—Sub-trop. Exp. Stat., Homestead.

1521. Lehr, J. J., Wybenga, J. M., and Rosanow, M.
Iodine as a micronutrient for tomatoes.
Plant Physiol., 1958, **33**: 421-7, bibl. 18.

In sand-water cultures with tomato plants potassium iodide increased tangential growth at the expense of radial growth, but decreased plant weight. Plants treated with iodide tended to show accelerated cluster formation and earlier flowering. They also produced higher yields. In soil cultures iodine applied as iodide improved the fruit yield, mainly by increasing the number of fruits but also partly by increasing fruit weight. In one of the experiments the fruits appeared to have an appreciably higher percentage of dry matter than the controls. Where a comparison was made, iodide gave better results than elemental iodine but the latter was also effective in increasing the fruit yield in pot culture experiments. It was confirmed that it is the concentration of iodine which determines whether iodine will have a harmful or a beneficial effect. [Authors' conclusion.]—Chilean Nitrate agric. Serv., Wageningen.

1522. GERALDSON, C. M.
Response of vegetable crops to soil reaction and lime.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 60-6, bibl. 22.

Tomato yields and quality were more reduced (smaller fruit, increased blossom-end rot and less marketable fruit) when ammonium sulphate was used in plots with an initial pH of 5–5·7, than when ammonium nitrate or other nitrate sources of N were applied. At pH 5·8–6·5 yields and quality of runner beans and cucumbers were reduced with the application of all the N as nitrate; results with tomatoes, peppers and cantaloupes were similar but less consistent. The use of sodium nitrate or of nitrate of soda-potash increased the initial soil pH by 0·5 to 1 unit, but with other nitrate sources the maximum rise was 0·5. Ammonium sulphate decreased initial pH by 0·5 to 1 unit, but the pH was decreased only slightly by ammonium nitrate. Results were not affected by the addition of Mn, Fe, Mo, B, Cu and Zn to the N-source materials. Tomato yields for one N source (ammonium nitrate) were in general larger at the higher pH range.—Gulf Coast Exp. Stat., Bradenton.

1523. BOTTINI, E., AND MORRA DI LAVRIANO, E.
Sulla possibilità della nutrizione vegetale attraverso le foglie. Ricerche eseguite sul pomodoro e sulla cicoria. (**The possibility of foliar nutrition of plants. Studies on tomato and chicory.**) [English summary 8 lines.]
Ann. Sper. agrar., 1958, **12**: 1175-90, bibl. 6.

Test and control plants were grown in pots, in a mixture of sand and soil. The test plants were sprayed 15 times (twice weekly) either with Foliar (a product containing 14% of N, 13% of P_2O_5 and 20% of K_2O) at 1 g. per l., or with a mixture of 0·06% biammonium phosphate and 0·04% potassium sulphate. In the latter series, the mixture was used either alone, or with the addition of one micronutrient (Zn, Mn, Fe, Mg or B). With tomatoes Foliar gave yields above the control, but the mixture gave the highest yields, particularly when reinforced by Zn or Mn. The addition of B, Fe or Mg, however, had a depressing effect, strongest with B, but yields were still above those from Foliar. Chicory responded very differently from tomatoes. The highest yields were from Foliar and from the mixture with additional Mg. All the remaining treatments reduced yields below the control, except the mixture+Zn which gave a result very slightly above the control.

1524. RICE, E. L., AND ROHRBAUGH, L. M.
Relation of potassium nutrition to the translocation of 2,4-dichlorophenoxyacetic acid in tomato plants.
Plant Physiol., 1958, **33**: 300-3, bibl. 15, illus.

Potassium deficient tomato plants, which were given potassium before or at the same time as radioactive 2,4-D was applied, had significantly greater stem curvatures, greater inhibition of growth, and greater movement of radioactive material than did plants which were given potassium 24 hours after application of the growth regulator. Those plants which received potassium three days before applying the 2,4-D showed the greatest stem curvatures and movement of radioactive material into the lower parts of the hypocotyls and roots. [From authors' summary.]—Univ. Oklahoma, Norman.

1525. SIMÃO, S., SERZEDELLO, A., AND WHITAKER, N.
Ação do ácido giberélico sôbre o tomateiro (*Lycopersicum esculentum* Mill.). (Nota previa.) (**Action of gibberellic acid on tomato plants (*Lycopersicum esculentum*). (Preliminary note.)**) [English summary ⅓ p.]
Rev. Agric. Piracicaba, 1958, **33**: 153-6, bibl. 2.

Tomato plants were sprayed twice (19 and 25 days after transplanting) with 0, 1, 10 or 50 p.p.m. solutions of gibberellic acid. Treated plants became chlorotic to an extent depending on the concentration used, but partially recovered their green colour within 4 days of treatment. At the 2 high concentrations stems and leaves elongated so rapidly during the 10 days following treatment, that they were deficient in supporting tissue and became pendulous at the shoot tips. The shape of the new leaves was longer and narrower, with much less indented margins than usual, and the texture was softer. In general, the differences in growth between treated and untreated plants disappeared a fortnight after the end of treatment. The 2 high concentrations markedly reduced the plants' resistance to leaf spot (*Septoria lycopersici*) and tended to induce earlier flowering.

1526. KRJAČKOV, P. JA.
The effect of growth substances on the ripening of tomatoes at high altitudes. [Russian.]
Tr. Kirg. s.-h. In-ta, 1956, No. 9, pp. 39-41, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,832.

At 2,037 m. above sea level, 0·001% 2,4-D sprayed on 2 tomato varieties 6 times during flowering advanced ripening and increased both fruit size and yield. The treatment also increased the percentage of seedless fruit without affecting the flavour.

1527. Krylov, A. V., Rakitin, Ju. V., and Tarakanova, G. A.
The transformation of ethyl alcohol in fruits when used as a ripening stimulant. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **121**: 374-7, bibl. 15.

Carbon-labelled ethyl alcohol at concentrations of 30·4%, 50% and 92·8% was injected into fully grown green tomato fruits, 0·5 ml. per 100 g. fresh weight, and the respiratory activity thereafter measured. The evolution of ethylene was greatest with the 50% solution and least with the 30·4%; ripening time was markedly reduced by the 50%, somewhat reduced by the 30·4% and increased by the 92·8% concentration as compared with the controls. These results are regarded as a further proof of the theory earlier expounded by one of the authors, namely that ripening time is inversely proportional to the intensity of ethylene production.

1528. Dimitrov, L.
Ringing tomatoes with corrosives. [Bulgarian.]
Ovoščarstvo i Gradinarstvo, 1956, No. 5, pp. 54-5, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,834.

Technical sulphuric acid (sp. gr. 1·82–1·84) at 1: 6 dilution applied to tomato stems, 5 cm. above the ground, formed a black depressed ring which prevented the flow of assimilates into the roots, thus advancing ripening without reducing total yields.

1529. Gellerman, Ja. M.
The effect of periodical warming of roots under low light conditions on the prevention of fruit drop in tomatoes. [Russian.]
Dokl. Mosk. s.-h. Akad. im. K. A. Timiryazeva, 1956, No. 25, pp. 221-5, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,635.

In water culture experiments with tomatoes periodical warming of the nutrient solution to 38° C. under lighting given by horizontally placed luminescent lamps [strength not stated] reduced the drop and increased the size of the fruits, especially on the 1st and 2nd inflorescences. With vertically placed lamps the results were even better.

1530. Kidson, E. B.
"Cloud" or vascular browning in tomatoes. IV. Polyphenol oxidase activity in cloud-susceptible fruit.
N.Z. J. agric. Res., 1958, **1**: 896-902, bibl. 16.

The browning in the vicinity of the vascular system characteristic of cloud appears to be polyphenol oxidase browning. Polyphenol oxidase has been found to be active in abnormally ripening cloud-affected wall tissue, but appears to be inactive in normally ripening wall tissue even in cloud-affected fruit. High polyphenol oxidase activity has been found in very young fruits, diminishing and finally disappearing with increasing maturity. It is suggested that cloud-affected fruits show an abnormal retention of polyphenol oxidase activity in the blotched areas. This activity persists in cloud tissue ripened to the orange-red stage on the plant. [Author's summary. For Part III, see *H.A.*, 24: 2817.]—Cawthron Inst., Nelson.

1531. Bhatt, J. G., and Verma, S. S.
Effect of growth regulating substances on virus affected tomato plants.
Sci. and Cult., 1958, **23**: 610-11, bibl. 6, illus.

Sprays of 20 p.p.m. of both β-3-indolyl proprionic acid and NAA at 25 ml. per plant caused tomato plants to recover from streak disease (mixed virus) within a fortnight. Plants treated with doses higher than 20 p.p.m. died.

1532. Crowley, N. C.
The use of skim milk in preventing the infection of glass-house tomatoes by tobacco mosaic virus.
J. Aust. Inst. agric. Sci., 1958, **24**: 261-4, bibl. 5.

Adelaide Dwarf Red tomato plants were sprayed with a 1 in 5 dilution of skim milk, with and without added Shirlan A.G., and inoculated with tobacco mosaic virus. All the plants became infected and there was no evidence that skim milk prevented infection. On the other hand, diluted skim milk, down to 1/1,000, mixed with the inoculum greatly reduced the infection of *Nicotiana glutinosa* with the same virus. In a further experiment, the residue of skim milk applied to *N. glutinosa* leaves up to 7 days before inoculation, and even when washed off with water 5 minutes after application, greatly reduced the production of lesions by the virus. Further investigations showed that the inhibiting substance in the skim milk may be precipitated by alcohol or half saturated ammonium sulphate and is probably a protein. Its effect has been found to be restricted to those parts of the plant to which it is applied. The manner of infection of glasshouse tomatoes by tobacco mosaic virus is discussed.—Waite agric. Res. Inst., Adelaide.

1533. Bergmann, L.
Über den Einfluss von Thiouracil und Cytovirin auf das Wachstum und die Virusproduktion isolierter Tomatenwurzeln. (**On the effect of thiouracil and Cytovirin on growth and virus multiplication in isolated tomato roots.**) [English summary 10 lines.]
Phytopath. Z., 1958, **34**: 209-20, bibl. 25.

Cytovirin and thiouracil reduced growth and also virus multiplication in isolated tomato roots infected with tobacco mosaic virus, but with both the reduction in growth was greater than the inhibition of virus synthesis. In untreated controls there was no difference between the growth of infected and non-infected roots.—Max-Planck-Inst. f. Biol., Abt. Melchers, Tübingen.

1534. GUATEMALA, MINISTERIO DE AGRICULTURA.
Protección de cultivos. Estudios sobre el tizón tardío del tomate. (**Crop protection. Studies on late blight of tomatoes.**)
Inf. an. Minist. Agric., Serv. co-op. interamer. Agric. 1957, pp. 149-50.

In a 3-year trial good control of *Phytophthora infestans* was obtained by spraying tomato plants fortnightly, or during heavy infection, weekly, with either maneb or zineb at 2 lb. per 100 gal. of water. Resistant strains are listed, with their yielding capacities. Of the soil chemicals compared for control of root-knot nematodes, parathion at 50 c.c. per 216 sq. ft gave the best results, urea was less effective, and Nemagon, Vapam and Dowfume did not significantly increase yields above those from untreated controls.

1535. WHITESIDE, J. O.
Experiments in controlling diseases of tomatoes in Southern Rhodesia.
Rhod. agric. J., 1958, **55**: 533-45, illus.

Leaf spot, caused by *Septoria lycopersici*, and the more serious late blight, caused by *Phytophthora infestans*, are briefly described and the results given of 3 trials of fungicides. Maneb (2 lb./100 gal. of Dithane M-22) gave the most effective control of both diseases. Spraying should start before an outbreak is expected and, when climatic conditions are favourable for late blight, the plants should be sprayed after every 2 in. of rain have fallen and not less than once a week. On this basis, 8–12 applications are normally required.

1536. ERCOLANI, G. L.
La *Rhizoctonia* del pomodoro. (**Fruit rot [*Corticium solani*] of tomatoes.**)
Inf. fitopat., 1958, **8**: 361-2, illus.

Preventive measures against this disease include selecting well drained soil, separating tomato crops on the same soil by a 6- to 7-year rotation, soil disinfection, seed disinfection, and the application of fungicides in irrigation water. Brief mention is made of curative treatment with antibiotics.

1537. ROHRINGER, R., STAHMANN, M. A., AND WALKER, J. C.
Effect of *Fusarium oxysporum* f. *lycopersici* and its metabolites on leaf constituents of susceptible and resistant tomatoes.
J. agric. Food Chem., 1958, **6**: 838-43, bibl. 13, illus.

Extracts from leaves of inoculated and uninoculated tomato plants of varieties susceptible or resistant to *Fusarium* wilt and of cuttings from plants treated with pectic enzymes, fusaric acid, and lycomarasmin solutions were examined by paper chromatography and compared as to relative amounts of free amino acids, sugars, some acidic components, and phenols present. Healthy plants of both varieties were very similar in respect to these constituents. Following infection a great number of components changed in concentration in plants of the susceptible variety; little or no change was observed in resistant plants. Many changes were nonspecific and secondary because of dehydration of the tissue by the wilting agents. In contrast, some were specifically induced by the primary action of the parasite or its metabolites. Fusaric acid produced changes characteristic of those in inoculated susceptible plants. An acidic component of the host tissue, obviously an organic phosphate, was affected in a way that suggests it is related to resistance. [Authors' summary.]—Univ. Wisconsin, Madison.

1538. PONTIS, R. E., AND FELDMAN, J. M.
La podredumbre zonal de los frutos del tomate en la Argentina causada por *Phytophthora capsici*. (**"Zonal rot" of tomato fruits in Argentina, caused by *Phytophthora capsici*.**) [English summary 5 lines.]
Rev. argent. Agron. B. Aires, 1958, **25**: 95-100, bibl. 14, illus.

A disease of tomatoes, apparently identical with buckeye rot, and caused by *Phytophthora capsici*, has been reported in Argentina for the first time. Control is best effected by staking the plants or by planting them on high mounds. Successful fungicidal treatments carried out and resistant varieties selected in the U.S.A. are mentioned.

1539. MILLER, P. M., AND STODDARD, E. M.
Increasing the hatching of eggs of cyst and rootknot nematodes with nabam.
Science, 1958, **128**: 1429-30, bibl. 5.

A solution of nabam, 0·55 g./l., reduced the hatching of *Meloidogyne* eggs when the egg masses were suspended in the solution alone, but markedly increased hatching when the solution was applied to the eggs in soil. It is suggested that nabam, or some of its decomposition products, in the presence of soil causes a dissolution of the adhesive substance enveloping the eggs. This effect was used to increase the nematicidal effect of V-C13, 0·25 ml. per l., in the control of *Meloidogyne* on tomatoes. V-C13 alone reduced the percentage of galled roots from 50% (control) to 33% but, with nabam added, this fell to 10%. Nabam alone caused an increase. It was also shown that nabam solution increased egg hatching of *Heterodera tabacum* in the soil.

1540. Hunter, A. H.
Nutrient absorption and translocation of phosphorus as influenced by the root knot nematode (*Meloidogyne incognita acrita*).
Soil Sci., 1958, **86**: 245-50, bibl. 9, illus.

Tomato seedlings were grown from their 2nd to 7th week in sand culture at ¼, ½, normal, and double nutrient levels, and with the nematodes infesting approximately 25, 50 and 90% of their roots. A nematode-free series was used for comparison. Radioactive P was supplied via the roots 4 hours before harvesting. The dry weight of tops was significantly reduced by infestation, except at the lowest nutrient level. At the highest nutrient level, it increased with increasing infestation. Root dry weight was not increased by infestation at normal and subnormal nutrient levels, but at the supernormal level, the nematode-free plants had the heaviest roots as well as the heaviest tops, and again, the greater the infestation, the higher was the dry weight. The presence of nematodes increased the P content of the roots, but did not affect that of the tops. The rate of P^{32} absorption at subnormal nutrient levels was much higher in healthy than in infested plants. Analyses of plants for N, K, Ca, Mg, Fe and Cu showed no evidence of deficiency due to nematodes, in fact the infested roots were significantly higher than the non-infested in N, K and Mg contents as well as in P, but the infested plants were chlorotic. In no case was translocation affected.

1541. Graniti, A., Ciccarone, A., and Porcu, S.
L'eriofide rugginoso del pomodoro combattuto con lo zineb? **(Can zineb control tomato russet mite?)**
Ital. agric., 1958, **95**: 678-86, bibl. 27, illus.

Aspor (87% zineb) was sprayed weekly during August at 0·5% on tomato plants in southern Italy, slightly infested with russet mite (*Vasates lycopersici*). For comparison, other plots were treated with a copper-calcium oxychloride product at 0·7% and others were left untreated. At the peak of infestation the mite populations on stems and leaves averaged 3,860 on control plots, 1,307 on zineb-treated plots and 4,954 on those receiving the oxychloride. Where the interval between treatments was extended to 2 weeks at the peak period, there was a marked increase in mites on zineb-treated plots, but numbers were still well below those on oxychloride-treated plots, and were rapidly reduced by resuming weekly treatment. The apparently much greater activity of another zineb product, Dithane Z-78, against *Phyllocoptruta oleivora* on citrus in the U.S.A. is briefly discussed.

1542. Stone, H. M., and Clark, P. J.
Mercury content of tomatoes.
N.Z. J. Sci., 1958, **1**: 373-7, bibl. 6.

Determinations were made of the mercury content of the skin and of the pulp of untreated tomatoes and of tomatoes sprayed with Aerocide P.M.4, a phenyl mercuric salicylate aerosol. The total mercury content of untreated tomatoes ranged from nil to 0·044 p.p.m., and of treated tomatoes from 0·010 p.p.m. to 0·075 p.p.m. Analysis of the results showed that at the 90% confidence level, 17·3% of fruit from treated glasshouses would contain more than 0·05 p.p.m. mercury, but where the number of applications were restricted to 7, only 1% of treated samples would be expected to exceed 0·05 p.p.m. [Authors' summary.]–D.S.I.R., Wellington.

1543. Yeatman, J. N., and Sidwell, A. P.
Judging quality of tomatoes for processing by objective color evaluation, with subjective estimation of defects.
Mktg Res. Rep. U.S. Dep. Agric. **235**, 1958, pp. 47, bibl. 56, illus.

A new inspection procedure was successfully based on juice colour measurement, using photoelectric instruments, and on subjective estimation of defects in the fruit. Colour readings were improved by removing the air bubbles from the juice, but as extra time was required for this process, it was not included in the procedure. The Hunter Color and Color Difference Meter was the most reliable of the instruments tested. A mechanical sampling device, used in 1954, was rejected as being unsatisfactory. Expected sampling errors for different numbers of hampers selected from each load and of tomatoes selected from each hamper were computed for estimation of defects (trim loss) and the percentage of U.S. No. 1 tomatoes.

1544. Masuda, T., and Hayashi, K.
Studies on pepper. I. Effects of seed-time on flowering and harvesting of mature fruits and yield of red pepper (*Capsicum annuum* L. var. *conoides* Bailey-HONTAKA). II. Effects of soil moisture on flowering, fruit setting and maturing of red pepper (HONTAKA). [Japanese, with English summary 38 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 91-8, bibl. 8.

Observations at Okayama University in 1954 and 1955 show that there were 3 flowering cycles, the first, that from July to August, alone being important for the production of ripe fruit. Drought had little effect on fruit setting but it considerably decreased the total number of flowers. Most of the fruits, 82% in an irrigated and 72% in a dry plot, needed heat sums of 1,000 to 1,300° C. to reach maturity.

1545. Zanotti, L.
Il peperone, coltura popolare e d'avvenire. **(Capsicums, a popular crop with a future.)**
Ital. agric., 1958, **95**: 736-56, illus.

Vitamin C contents are quoted for 8 capsicum varieties. Thinning and topping increased the normal content in the varieties Chili, Pfefferoni and Paradiso. Red pepper contains 75,000 I.U. of carotene per 100 g. Features and cultivation of the main horticultural varieties are described, and export from Italy is discussed, with figures for 1956–7.

1546. Schutt, K.
Schnellbestimmung von Vitamin C in Paprikafrüchten. **(A rapid method of estimating vitamin C in capsicum fruits.)** [English, French and Spanish summaries ¼ p. each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 321-30, bibl. 4.

A method of vitamin C determination is described, which takes only 10–15 minutes to perform. In red and green capsicum fruits the highest contents of ascorbic acid were at the tip of the fruit, and the lowest at the base. Maximum contents of ascorbic acid were found in mature red fruits. After storage at room temperature or in cellars, ascorbic acid contents sometimes showed increases of up to 100%. Ascorbic acid content in dried fruits after 9 months' storage was similar to that in the fresh tissue.

1547. Dikij, S. P.
Summer planting of eggplants and peppers. [Russian.]
Konservn. ovoščesuš. Prom-st', 1957, No. 6, pp. 36-7, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,625.

In the Čečen-Inguš ASSR [Northern Caucasus] eggplants and peppers planted in the spring develop physiological withering by the middle of August, which reduces the yield and the length of the harvesting period. Planting in the summer reduced the number of affected and unsaleable fruits by ½–⅔ and increased yields by 9–34%; the main harvest period became September. A combination of spring and summer planting is recommended.

1548. Solymosy, F.
Dohánymozaikvírus és uborkamozaíkvírus hatása a fűszerpaprika fejlődésére (Előzetes közlemény). **(The effect of tobacco and cucumber mosaic viruses on the development of red pepper (*Capsicum annuum*.). Preliminary communication.)** [English and Russian summaries 1 p. each.]
Növénytermelés, 1958, **7**: 109-20, bibl. 9.

Pepper plants in 4 developmental stages were infected with tobacco mosaic virus (TMV), cucumber mosaic virus (CMV) or with both viruses (TMV+CMV). From the practical point of view, infections with CMV during the 12–14 leaf stage and with TMV or TMV+CMV during the 6–8 leaf stage were the most harmful, resulting in reductions in the average number of ripe fruits, index number (average number × length of fruit per plant) and total yields.

1549. Bazán de Segura, C.
La marchitez ó wilt del aji en el Perú. **(Withering or wilt of red pepper in Peru.)** [English summary ½ p.]
Inf. mens. La Molina **105**, 1958, pp. 1-19, bibl. 9, illus.

Although presenting similar symptoms to red-pepper wilt caused in other countries by *Fusarium annuum*, the disease in Peru is caused by *Phytophthora citrophthora*. The pepper variety Escabeche Lurín is normally 80–90% resistant, but over 60% of the crop was destroyed in an exceptionally hot summer. The preventive measure most strongly recommended is progressive earthing up of the plant bases, and avoiding direct contact of the irrigation water with them and with the roots by increasing the distance of the irrigation furrows from the plants as the roots spread. This treatment results in deeper rooting and consequent protection of the root system from overheating.

Sundry crops.

1550. Spivey, C. D., Woodard, O. J., and Woodward, W. D.
The production of okra in south Georgia.
Bull. Ga agric. Exp. Stats **44**, 1957, pp. 39, illus.

The most satisfactory varieties for fresh market production in Georgia are Clemson Spineless, Louisiana Green Velvet, Dwarf Green Long Pod and Hastings Improved Perkins; for use in soup production Emerald is the best variety. A good fertilization programme is 600–1,200 lb. per acre of an 8–8–8 analysis, half of which should be applied before planting, and the rest 4–6 weeks after planting. In seasons of unusually heavy rainfall, an additional 25–30 lb. N may be beneficial for processing okra. In a minor element study only Mg was found to give increased yields. Drills should be spaced at 6–12 in. apart according to moisture availability. Pre-planting fumigation with Dowfume W–40 or DD (at 10 gal. per acre) may be necessary for nematode control.

1551. Imazu, T., and Ōsawa, T.
Studies on udo, *Aralia cordata* Thunb. (2) On the dormancy of domestic and wild udo seeds. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1958, **27**: 149-53, bibl. 10.

Germination of udo seeds was poor immediately after harvesting, and after dry storage, but good after storage in cold wet sand. Seeds of garden udo germinated more easily than seeds from wild plants. Storage of dry seeds at 0–2° C. effectively broke dormancy of udo seeds. Dormancy was not affected by injuring seed coats, soaking in concentrated sulphuric acid, thiourea treatment (0·2%), alternating temperatures, or washing in running water. Light had no decisive effect on germination. [For Part 1, see *H.A.*, 29: 556.]

Noted.

1552.

a ARREGUÍN, B.
A study of methyl glyoxal and of glyoxalase.
Phyton, 1958, **11**: 53-62, bibl. 16.
Glyoxalase was discovered in *Capsicum* fruits.

b (BARGER, W. R., AND OTHERS.)
Shipping tests with California lettuce.
Agric. Mktg, 1958, 3 (10): 14.
Precooling and transport below 40° F. increased subsequent shelf life.

c BLACK, W. E., AND OWENS, J. B.
Florida growers forecast supplies for a better tomato market.
Amer. Veg. Gr, 1958, **6** (12): 9, 26, illus.
Accurate records of plantings and considerations of heat unit requirements.

d BRETT, C. H., AND BRUBAKER, R. W.
Tests comparing eight insecticides for control of the Mexican bean beetle.
J. econ. Ent., 1958, **51**: 553-4, bibl. 2.
Sevin 1 or 2% dust showed the best promise against *Epilachna varivestis* [see also *H.A.*, 29: 558g].

e DARPOUX, H., HALMOS, E., AND LEBLANC, R.
Étude de l'action systémique de diverses substances, la plupart antibiotiques. (**A study of the systemic action of various substances, chiefly antibiotics.**)
Ann. Épiphyt., 1958, **9**: 387-413, bibl. 33, illus.
Laboratory tests for fungicidal activity and phytotoxicity using various vegetables.

f DOMAN, N. G., AND VAKLINOVA, S. G.
The effect of different forms of nitrogen on the composition of labelled photosynthetic products in maize and bean. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **122**: 653-6, bibl. 17, illus.
The sugar, amino acid and organic acid contents of leaves of plants treated with NH_4 and NO_3 nitrogen.

g FRANKEN, A. A., AND ROORDA VAN EYSINGA, J. P. N. L.
Bewortelingsdiepte van asperge. Een onderzoek op stuifzandgrond en enkele andere grondsoorten in Noord-Limburg. (**Root penetration of asparagus. A study on inland dune sand and some other soil types in North Limburg.**) [English summary 12 lines.]
Meded. Dir. Tuinb., 1958, **21**: 491-4, bibl. 6, illus.
Most roots found between 25 and 60 cm. deep, and little penetration below 1 m.

h FUJIMURA, T.
Studies on pithiness in root vegetables. Part 1. Anatomical observations on the process of pithiness in radish roots. [Japanese, with English summary 18 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 81-5, bibl. 10.

i GEORGBERIDZE, I. A.
The prospects of using vegetative hybridization in developing new tomatoes. [Russian.]
Agrobiologija, 1958, No. 5, pp. 46-9.
With particular reference to high dry matter content.

j GREEN, J.
The distribution of tocopherols during the life-cycle of some plants.
J. Sci. Food Agric., 1958, **9**: 801-12, bibl. 23.
In peas and 3 cereals.

k HYAMS, E.
A trial of melon varieties.
Gdnrs' Chron., 1959, **145**: 27, 30.
A preliminary report on melon varieties for cold frames or cloches in the small garden.

l IBBETT, W. C.
Devon swedes.
Agriculture, Lond., 1958, **65**: 357-60.
Culture and marketing of swedes grown on red soil for human consumption.

m JÄHNL, G.
Ergebnisse der Rübenversuche des Jahres 1957. (**The results of beet trials in 1957.**)
Versuchsergebn. alpenländ. Landw. Gumpenstein, 1958, No. 45, pp. 80, illus.
Including also variety, time of sowing and harvesting trials with turnips.

n JOHNSTON, D. A.
Tomato fruit quality. The effect of chilling injury.
J. Agric. W. Aust., 1958, **7**: 573-5, bibl. 3.
More than 95 hrs below 60° F. in the week preceding harvest caused abnormal ripening. [See also *H.A.*, 28: 3777.]

o KASTING, R., AND DELWICHE, C. C.
Ornithine, citrulline, and arginine metabolism in watermelon seedlings.
Plant Physiol., 1958, **33**: 350-4, bibl. 18.

p KRISTOF, P.
Rendement de quelques tomates hybrides F_1 en pleine terre. (**Yield from some hybrid tomato varieties in the open.**)
Rev. hort. suisse, 1959, **32**: 57-9.
Four hybrid varieties outyielded Best of All.

q Kummer, M., and Lekve, O.
Die Eignung einiger Stabtomatensorten für den Anbau unter Glas. (**The suitability of some varieties of staked tomatoes for growing under glass.**)
Dtsch. Gartenb., 1958, **5**: 281-4, bibl. 1, illus.
Behaviour of 8 varieties under unheated glass.

r Laws, E. Q., and Webley, D. J.
Determination of demeton-methyl residues in plant material.
Analyst, 1959, **84**: 28-32, bibl. 7.
Including amounts found in cabbages and lettuces at intervals up to 30 days after spraying.

s McDaniel, I. N.
The lettuce root aphid [*Pemphigus bursarius*] in Maine.
Me Fm Res., 1958, **6** (3): 5-8, illus.
Alternate hosts, natural enemies and control by cultural measures.

t Meier, W.
Kombinierte Bekämpfung des Erbsenblattrandkäfers (*Sitona lineata* L.) und der Erbsenblattlaus (*Acyrthosiphon pisum* Harris)? (**Combined control of the pea weevil and the pea aphid?**)
Mitt. Schweiz. Landw., 1958, **6**: 30-2, bibl. 2, illus.
Dates for spraying were too far apart for control measures to be combined.

u Moore, E. L., and Kermit, R. R.
Results of two years of tomato production in plastic greenhouse.
Miss. Fm Res., 1958, **21** (8): 4, 8, illus.
Greenhouse management, cultural needs and varietal studies.

v Moore, J. F.
Golden Lake. A new variety of wax pole bean.
Stat. Circ. Wash. St. agric. Exp. Stat. **333**, 1958, pp. 3.
Suitable for the climatic conditions of western Washington.

w Mottier, P.-P.
Essais comparatifs de tomates cultivées en serre et pleine terre. (**Comparative trials with tomatoes grown under glass and in the open.**)
Rev. hort. suisse, 1959, **32**: 21-2.
The early maturity of Fournaise F_1 was again impressive. [For earlier work see *H.A.*, 28: 1504.]

x Nakagawa, H., and others.
The new Chinese cabbage varieties Asahi and Michinoku. [Japanese, with English summary ½ p.]
Bull. Tohoku nat. agric. Exp. Stat., 1958, No. 13, pp. 64-72, illus.
Varietal descriptions.

y Nieuwhof, M., and Kraai, A.
Praktijkproeven met het bloemkoolras Lecerf 1956–1957. (**Variety trials with Lecerf cauliflowers, 1956-1957.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1958, **21**: 774-80, illus.
17 out of 35 strains are recommended.

z N.S.W. Department of Agriculture, Biological Branch.
Diseases of carrots.
Agric. Gaz. N.S.W., 1958, **69**: 415-18, illus.
Virus, fungus and other diseases, and their prevention and control.

1553.

a Odland, M. L., Noll, C. J., and Lytle, I. R.
Vegetable variety trials.
Prog. Rep. Pa agric. Exp. Stat. **189**, 1958, pp. 8.
Onions, brassicas, beans, sweet peppers, tomatoes, beets, carrots and radishes.

b Ozaki, H. Y., Ray, H. E., and Ozaki, C. T.
Yields and quality of peppers as affected by ammonium nitrate and sulfate of potash treatments.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 210-15, bibl. 3.
For another account see *H.A.*, 29: 550.

c Philipp, F.
Ergebnisse der Gemüsesortenversuche 1957, III. (**The results of vegetable variety trials 1957, III.**)
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 276-87, illus.
Dealing with a few early pea varieties.

d Pridham, J. B.
Occurrence and metabolism of oligosaccharides in the broad bean (*Vicia faba*).
Nature, 1958, **182**: 1687-8, bibl. 5.

e Ragazzi, G.
La coltura del pomodoro in Italia. IV. Le avversità e le cure alla recolta. (**Tomat growing in Italy. IV. Adverse factors an care in harvesting.**)
Riv. Ortoflorofruttic. ital., 1958, **42**: 344-58, illus.

Protection from wind, frost, hail, fungus diseases, pests and physiological disorders; virus symptoms; brief advice on harvesting. [For Parts I–III see *H.A.*, 28: 3742.]

f REED, L. B., AND DOOLITTLE, S. P.
Insects and diseases of vegetables in the home garden.
Home Gdn Bull. U.S. Dep. Agric. **46**, 1958, pp. 48, illus., 35 cts.
Symptoms and control arranged under crop headings.

g ROBINSON, E., AND CARTWRIGHT, P. M.
Nucleolytic enzymes in growing root cells.
J. exp. Bot., 1958, **9**: 430-5, bibl. 11.
Ribo- and deoxyribonucleases in bean roots at optimum pH.

h SLEESMAN, J. P., AND JONES, H. A.
Hybrid onions are here to stay.
ANON.
History of hybrid onions.
Amer. Veg. Gr, 1958, **6** (10): 12, 27, illus., and 13, illus.
Short-day, long-day and intermediate-day hybrids. [See also *H.A.*, 28: 2717a.]

i STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Stammeforsøg med holdbar vinter-hvidkål 1954-57. **(Strain trials with winter cabbage of good keeping quality 1954-57.)**
Tidsskr. Planteavl, 1958, **62**: 541-4.
Strains of Amager varieties.

j TS'O, P. O. P., BONNER, J., AND VINOGRAD, J.
Structure and properties of microsomal nucleoprotein particles from pea seedlings.
Biochim. biophys. Acta, 1958, **30**: 570-82, bibl. 11, illus.
With particular reference to the role of Mg in the linkage of nucleoprotein units.

k URE, J. S., AND LIM EOW HWA.
The cultivation of tomato as an off-season crop on padi land.
Malay. agric. J., 1958, **41**: 97-9, illus.

l WALKER, J. C.
Two new pickling cucumber varieties resistant to scab and mosaic.
Plant Dis. Reptr, 1958, **42**: 1337-8, bibl. 5.
Characteristics of Wisconsin SMR15 and Wisconsin SMR18 are described.

TOBACCO.

General.

See 1598b, e, g, i, k, l, m, p, 1988.

Seeds and seedbeds.

1554. ČIRKOVSKIJ, V. I.
The effect of DDT on tobacco seed during long-term storage. [Russian, with English and German summaries.]
Vestn. s.-h. Nauki., 1956, No. 3, pp. 142-5, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 16,490.

Several examples are quoted showing that 5% DDT dust, applied against storage pests of tobacco seed, at 1 to 100 g./kg. seed, affected germination insignificantly or not at all in samples that were stored for 2 to 5 years after treatment.

1555. WELLS, P. V.
Ecological significance of red light sensitivity in germination of tobacco seed.
Science, 1959, **129**: 41-2, bibl. 2.

Red light is much more effective than light of shorter wavelength in promoting the germination of certain light-sensitive seeds, such as those of *Nicotiana trigonophylla* used in the present study. Measurements of light transmission in sand and clay soils showed that the relative energy transmission was greatest at the red or long-wave end of the spectrum. Thus seeds sensitive to red light should be able to germinate at depths which approach the maximum to which visible light will penetrate and at which the risks of rapid desiccation will be diminished. On the other hand, the penetration of far-red light, which has been shown to inhibit germination, is greater than that of red light and it can be inferred that at a level just above the zone of perpetual darkness the inhibiting effects of far-red radiation will prevail. The mode of spread of wild species of *Nicotiana* is discussed in the light of these conclusions.—Duke Univ., Durham, N.C.

1556. FREEMAN, J. F., AND STROUBE, E. W.
Vaporizing methyl bromide for soil fumigation in small areas.
Down to Earth, 1958, **14** (3): bibl. 1, illus.

By immersing 1 lb. cans of methyl bromide in a bucket containing water at 140° F. vaporization was completed within 5 minutes. When the gas was released beneath plastic sheets covering tobacco seedbeds, as good control of weeds was obtained within 3 hours as was obtained with much longer exposure to methyl bromide vaporized or evaporated in conventional ways.—Ky agric. Exp. Stat., Lexington.

1557. PETROV, R.
Covering tobacco seed frames. [Bulgarian.]
Bŭlg. Tjutjun, 1957, **2**: 104-7, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 58/540.

Covering seed-bed frames with straw mats resulted in morning temperatures that were regularly higher than in frames covered by branches, and the seedlings were ready for transplanting 3–8 days earlier.

Soil management and nutrition.

1558. ŠABANOV, D. S.
Shortening the rotation in tobacco growing (in Bulgaria). [Russian.]
Zemledelie, 1958, **6** (8): 86-90.

Autumn-sown cover crops of winter vetches, winter peas, spring vetches, wild vetches, rye, and yellow and blue lupins increased the yield of the succeeding irrigated tobacco crop. This increase was greatest following winter peas grown as a green manure crop and winter vetches grown for hay. Spring vetches and lupins ploughed in as green manures reduced quality. The cover crops increased the humus content of the soil by 0·2–0·3% and improved its crumb structure. No difference in tobacco yield or quality was noted when the soil was ploughed once or twice before planting, but early disposal of the cover crop improved quality. Wild vetch was tried because of the inadequate supply of cultivated vetch seed and was found satisfactory.

1559. MILJANTSCHEW, I., AND WARTANJAN, A.
Spring soil management of tobacco fields. [Bulgarian.]
Bŭlg. Tjutjun, 1957, **2**: 102-4, from *Abstract Card, Inst. Tabakforsch., Dresden*, No. 58/499.

The highest yields from tobacco were obtained after autumn ridging followed by ploughing three times in the spring. Yields were 17% higher than from the control plot, in which autumn ridging was followed by cultivating three times in the spring.

1560. GAMMON, N., Jr., AND KINCAID, R. R.
Some plant responses and soil changes resulting from controlled pH levels in experiments with cigar-wrapper tobacco.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 287-93, bibl. 7.

Cigar-wrapper tobacco was grown for 4 seasons on a sandy loam at 5 controlled pH values ranging from 4·5 to 6·3. Quality was highest at intermediate pH values, while yields were highest at the lowest pH. Leaf Mn contents increased significantly with increased soil acidity; the trend with leaf N was similar but less pronounced. [For earlier work see *H.A.*, 27: 2578.]—Fla agric. Exp. Stats, Gainesville and Quincy.

1561. PEUSS, H.
Untersuchungen zur Ökologie und Bedeutung der Tabakmycorrhiza. (**Studies on the ecology and significance of mycorrhiza of tobacco.**)
Arch. Mikrobiol., 1958, **29**: 112-42, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 38,608.

A method was developed for artificial synthesis of mycorrhizae in tobacco, but this would not work under sterile conditions. The growth and spread of the mycorrhizal fungus (a non-septate species) was studied under a variety of soil conditions as well as in plant water culture. Peat and peat extract inhibited the infection, while pine needle mulch or extract promoted the infection. The mycorrhizal plants developed better than the non-mycorrhizal plants, but it was not possible to relate this to increased nutrient ion uptake. In solutions that were deficient in minerals the growth and development of the mycorrhizae as well as the plants were retarded.—Bot. Abteilung Madaus, Köln-Merheim.

1562. MÓGER, J.
Az aljtrágyázás hatása a dohánytermésre. (**Tobacco crop responses to subsoil manuring.**)
Agrártudomány, 1957, No. 1/2, pp. 30-2, from *Hung. agric. Rev.*, 1957, **6** (3), Abstr. 178.

The following treatments were applied to poor sandy soils used for tobacco growing: F.Y.M. broadcast on the surface; turning over the unmanured sand; and the Egerszegi method of subsoil manuring in which about 500 quintals of organic matter per "cadastral hold" (1·42 ac.) is placed in several layers in the soil, the lowest at a depth of 60 cm. In comparison with control plots yields were increased by 48% in the turned sand, by 100% by F.Y.M. and by 265·6% by the subsoil treatment, with no deterioration in quality.

1563. TEJWANI, K. G., AND VENKATRAMAN, K. V.
Nutritional balance in flue-cured tobacco.
Soil Sci., 1958, **86**: 310-12, bibl. 17.

The cations K, Ca and Mg and the anions N, P, S, Cl and Si were analysed in 24 samples of flue-cured tobacco grown in different parts of India. The leaves showed wide variations in composition, but despite this the ratio between the sum of the cations and the sum of the anions was virtually constant (extreme range 0·73 to 1·12). This suggests that it should be possible to improve quality by regulating cation and anion applications in ways which would tend to raise K and reduce N contents.—Cent. Tob. Res. Inst., Rajahmundry.

1564. POPOVIČ, Ž., AND OTHERS.
Prilog poznavanju brzine apsorpcije i assimilacije fosfora kod duvana. (**A study on the absorption and assimilation of phosphorus by tobacco.**) [English summary 9 lines.]
Arh. poljopr. Nauke, 1958, **11** (33): 132-5, bibl. 2.

P^{32} was applied to pot grown tobacco plants at 9 periods ranging from 1 hour to 10 days before the plants were cut for analysis. P uptake became apparent within 1 hour of application, when also, with the exception of the 10-day interval, the proportion of P occurring as nucleoproteids was at its highest.

1565. Popović, Ž., Tošić, L., and Tomljenović, T.
Prilog poznavanju ishrane *Orobanche ramosa* L. na duvanu. (**A study on the nutrition of *Orobanche ramosa* on tobacco.**) [English summary ⅓ p.]
Arh. poljopr. Nauke, 1958, **11** (33): 34-7, bibl. 5.

Radioactive P was applied to the roots and leaves of tobacco infested with broomrape. More P was taken up by the broomrape than by the tobacco from the soil application, but less from the leaf application. The method of application also affected the distribution of P in the phospholipid, mineral phosphate and nucleoproteid fractions in both plants.

1566. Ramunni, A.
Prove di assorbimento per via fogliare del potassio, sotto forma di sali diversi, in *Nicotiana tabacum*. (**Experiments on foliar absorption of various potassium salts by *Nicotiana tabacum*.**) [English summary ¼ p.]
Tabacco, 1958, **62**: 245-54, bibl. 4, illus.

Tobacco seedlings were planted in an artificial K-deficient soil and supplied via the roots with complete (+K) or K-free (−K) nutrient solutions. After 4 weeks the −K plants were divided into 4 groups: −K with no foliar treatment (−K), sprayed with potassium citrate (*c*), with potassium nitrate (*n*), and with potassium phosphate (monobasic) (*p*). Each of the 3 salts was at a concentration giving 0·72% of K, and was applied at 4-day intervals. The experiment continued until flower buds appeared on the +K plants. The descending order of leaf dry matter contents was +K, *c*, *n*, −K, *p*; that of leaf K was +K, *c*, *n*, *p*, −K; that of leaf P was *p*, −K, *n*, *c*, +K; that of total foliar N was *n*, +K, *p*, −K, *c*; and that of alkaloids was *c*, *n*, +K, −K, *p*. Thus the citrate treatment was very favourable, the phosphate treatment unfavourable, and the nitrate treatment moderately favourable. Only in +K and *c* plants were visible K-deficiency symptoms completely absent. [For work on foliar absorption of N and P see *H.A.*, 28: 2735 and 2736.]

1567. Hutcheson, T. B., Jr., Woltz, W. G., and McCaleb, S. B.
Potassium - sodium interrelationships. 1. Effects of various rates and combinations of K and Na on yield, value, and physical and chemical properties of flue-cured tobacco grown in field and greenhouse.
Soil Sci., 1959, **87**: 28-36, bibl. 21.

Greenhouse investigations of the influence of Na and K on the nutrition of flue-cured tobacco grown in sand cultures showed the essentiality of K for normal plant development [see also *H.A.*, 28: 560]. Na appeared to have little effect upon plant growth when supplied in nutrient solutions with or without K. When K was either not supplied or supplied at low levels in solutions, the presence of Na was observed to delay the appearance and lessen the degree of severity of K-deficiency symptoms. This same general effect was observed in the field experiments conducted on 3 soils at low K levels, when rates of Na not exceeding 39·5 lb. of Na_2O per acre were applied. Thus, it would seem that the Na ion at least partially substituted for K in some plant process or processes, when K was in low supply. Even though Na does appear to be involved in plant metabolism to some extent when K is limiting, its effect was not of sufficient magnitude to influence the yield of flue-cured tobacco plants grown in either the field or quartz sand cultures. Price per pound of the cured leaves of field-grown tobacco was increased by applications of up to 39·5 lb. of Na_2O per acre, when K was not applied. This effect is probably related to the suppression of marginal burning of the leaves characteristic of K deficiency. From the results of these investigations, it would not seem feasible to suggest that any of the K normally included in flue-cured tobacco fertilizers be replaced by Na. Because of the indications that at low levels of K Na may perform some of the functions in the plant normally performed by K, it would appear advisable to avoid the use of Na in compounding experimental fertilizers to be used to evaluate critically the effects of K on the nutrition of flue-cured tobacco. [From authors' summary.]—N.C. agric. Exp. Stat.

Climatic factors and irrigation.

1568. Heggestad, H. E., and Middleton, J. T.
Ozone in high concentrations as cause of tobacco leaf injury.
Science, 1959, **129**: 208-10, bibl. 9.

The appearance of "weather-fleck" was correlated with high values for ozone in the atmosphere. An approximate threshold value was 20 p.p. 100 m. for about 3 hours in a susceptible variety. Variation in leaf injury also appeared to be due to differences in stomatal action.—U.S.D.A., Beltsville, Md, and Univ. Calif., Riverside.

1569. Povilaitis, B.
Varietal reactions to weather fleck.
Lighter, 1958, **28** (4): 1.

In tests at Delhi Tobacco Substation 5 important flue-cured varieties showed weather fleck damage in the following ascending order: Delcrest, Jadel, Virginia Gold, Hicks and White Gold. Among introduced varieties most European and Near East varieties showed severe fleck by July, but some later varieties, such as the Japanese air-cured Enshu, showed only slight fleck by September. Among *Nicotiana* species the following have shown no fleck: *N. debneyi*, *N. glauca*, *N. noctiflora*, *N. paniculata* and *N. maritima*.

1570. Postiglione, L.
Sulle quantità di acqua d'irrigazione al tabacco. (**Quantities of water for irrigation of tobacco.**) [English summary ¼ p.]
Tabacco, 1958, **62**: 269-80, bibl. 10.

Burley tobacco grown in a sandy soil was higher in yield and quality, where the soil moisture was maintained at approximately ⅔ of field capacity, than where the figure was ½ or ⅓ of field capacity. Omitting the 4th and 5th harvestings of the season, which followed exceptionally heavy rainfall, the yields of both fresh and dry weight rose progressively with increased water supply, with a significant difference between the results for ⅔ and ½ field capacity.

Topping.

(*See also* 1598a.)

1571. Woltz, W. G., and Marshall, H. V., Jr.
Top tobacco early.
Res. and Fmg N.C., 1958, **17** (2): 11.

Yield and value of tobacco decreased as topping was delayed beyond the early button stage. Other tests showed that yields increased with the number of plants per acre and with the number of leaves per plant. Fertilizer had the same effect on yield of plants topped high as on those topped low. Close spacing and high topping (8,000 plants topped at 20 leaves) gave the highest yields, but quality was low. It is considered that the desirable number of leaves per acre lies between 100,000 and 130,000.

Physiology and biochemistry.

1572. Weier, T. E.
The cytology of mesophyll tissue in *Oenothera* and *Nicotiana*.
Amer. J. Bot., 1958, **45**: 603-8, bibl. 8, illus.

There is considerable variation in chloroplast structure and in the presence, distribution, and number of mitochondria in the mesophyll of *Oenothera* and *Nicotiana* leaves. This variation appears to be correlated with physiological activity and indicates the advisability of detailed studies correlating morphology and function, and of viewing with caution the assumption that grana structure of the chloroplast is universally present. [Author's summary.]—Univ. Calif., Davis, Calif.

1573. Solt, M. L., and Dawson, R. F.
Production, translocation and accumulation of alkaloids in tobacco scions grafted to tomato rootstocks.
Plant Physiol., 1958, **33**: 375-81, bibl. 17.

Alkaloid yields and distribution patterns have been investigated in the system tobacco scion–tomato rootstock. Consistent with earlier findings, yields were greatly lowered as a result of grafting with tomato rootstocks. Removal of the apical bud (topping) of the tobacco scion led to a virtual restoration of alkaloid yields normal for the variety. Substituting a tomato bud for the apical bud of the tobacco scion gave intermediate yields. Defoliation of the tobacco scion did not reduce alkaloid yields. Most of the alkaloid of the tobacco scion was located in the graft union and in the stem immediately above the graft union. Such localization was not found in tomato scions [top-] grafted upon tobacco scions. Alkaloid was found in tomato stems and leaves below an approach-graft union with a topped tobacco scion grown on a tomato rootstock. Labelled (with tritium) nicotinic acid was not converted to nicotine in excised tomato scions that had grown atop tobacco scions. It is concluded that the principal site of alkaloid synthesis in the system tobacco scion–tomato rootstock is the graft union and the tobacco stem immediately above it. Some of this alkaloid is translocated upward to be deposited in leaf and stem higher on the plant. Evidence from approach-grafting experiments is interpreted to mean that alkaloid can be translocated downward but that the graft union presents a barrier to such translocation. The possible nature of this barrier is discussed. It is indicated that the high alkaloid yielding capacity of the graft union and of the adjacent stem tissues is probably atypical. Thus, the direct contribution of the shoot to its own alkaloid content in intact tobacco plants is probably over-estimated when calculations are based upon the alkaloid yields of grafted plants. [Authors' summary.]—Columbia Univ., N.Y.

1574. Lamberts, B. L., and Byerrum, R. U.
Glutamate as a precursor for the pyrrolidine ring of nicotine.
J. biol. Chem., 1958, **233**: 939-43, bibl. 19.

Glutamic acid-2-C^{14} was readily absorbed by young *Nicotiana rustica* plants growing in water culture and was converted into radioactive nicotine. Degradation of the radioactive nicotine showed about 90% of the C^{14} to be present in nearly equal amounts in the carbon atoms from positions 2 and 5 of the pyrrolidine ring. This pattern of labelling supports the hypothesis that a symmetrical intermediate is formed along the pathway of incorporation of glutamic acid into the pyrrolidine ring.—Mich. St. Univ., East Lansing.

1575. Il'in, G. S., and Lovkova, M. Ja.
Tobacco alkaloids and nitrogen metabolism.
[Russian, with English summary ¼ p.]
Biohimija, 1958, **23**: 814-18, bibl. 29.

Following the detection of nicotine and anabasine in the root sap of *Nicotiana tabacum*, *N. glutinosa* and *N. glauca* 15 amino acids were separated by paper chromatography and quantitatively assayed. Certain differences found in the composition of the amino acids are attributed to specificity of alkaloid metabolism. Monoaminodicarbonic acids were also found in the sap.

1576. Hagen, G. L., and Gunckel, J. E.
Free amino acid levels in *Nicotiana glauca*, *N. langsdorfii* and their interspecific hybrid following gamma irradiation.
Plant Physiol., 1958, **33**: 439-43, bibl. 19.

Two *Nicotiana* species and their species hybrid were subjected to varying dosages of gamma-irradiation for a period of 2 months. By the end of this period leaf abnormalities were evident with all dosages in the *N. glauca* parent, at above 50 r per day in the hybrid and at above 150 r per day in the *N. langsdorfii* parent. In general, where leaf abnormalities occurred, there was a concomitant increase in the free amino acid content of these leaves. Similarities, both morphological and physiological, to other organisms under stress conditions [and to the frenching phenomena in tobacco] are discussed. [Authors' summary.]—Rutgers Univ., New Brunswick, N.J.

1577. Vickery, H. B., and Levy, C. C.
The metabolism of the organic acids of tobacco leaves. XV. Effect of culture of excised leaves in solutions of potassium phosphate.
J. biol. Chem., 1958, **233**: 1304-8, bibl. 7.

It was recorded in a previous paper [*H.A.*, 28: 564] that, when tobacco leaves were cultured in darkness in solutions containing potassium phosphate, citric acid accumulated to a greater extent than in leaves cultured in water. This observation has been confirmed, but the explanation seems to be that the leaves acquired bicarbonate ion, which was taken up from the air by the alkaline solution during the culture period. As is already known, the bicarbonate ion is rapidly assimilated into citric acid. The provision of phosphate may have influenced the accumulation of water-soluble substances to a small extent, but apart from this it had no specific effect, whether administered in acid, neutral or alkaline solutions. The results also suggest that the enzyme systems concerned with the metabolism of organic acids in tobacco leaves are remarkably tolerant of the presence of abnormally high concentrations of salts.—Conn. agric. Exp. Stat., New Haven.

1578. Mihajlov, M. K.
A study of oxy-derivatives of cinnamic acid in tobacco by paper chromatography. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **121**: 330-3, bibl. 14.

In freshly fermented oriental tobacco polyphenols of the cinnamic acid group included caffeic, chlorogenic and neochlorogenic acids but not free quinic acid. [For flavonic derivatives see *H.A.*, 27: 2615q.]

1579. Zucker, M., and Ahrens, J. F.
Quantitative assay of chlorogenic acid and its pattern of distribution within tobacco leaves.
Plant Physiol., 1958, **33**: 246-9, bibl. 12.

A colorimetric method is described. There is a distinct downward gradient of chlorogenic acid from leaf tip to base. The concentration of chlorogenic acid found in stem and root tissue was about one quarter of that present in leaves. Synthesis occurred, in the light only, in leaf discs and also stem sections, but not in excised roots.—Conn. agric. Exp. Stat., New Haven.

1580. Ferguson, T. P., and Weaving, A. S.
Rutin in tobacco grown in a greenhouse.
Nature, 1959, **183**: 64, bibl. 8.

In agreement with the findings of other workers, the total content of polyphenolic compounds in glasshouse-grown tobacco was much less than in field-grown tobacco, but contrary to previous reports [*H.A.*, 28: 3829] rutin was present, although at much lower levels than in field-grown tobacco. No other flavonols or flavonol glycosides could be detected. The variety Hicks was used for the experiment.—Imp. Tobacco Co., Bristol.

1581. Mihajlov, M. K.
The identification of kaempferol in tobacco. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **122**: 1068-70, bibl. 6.

It has been established by paper chromatography that both fresh and fermented tobacco leaves contain kaempferol (3,5,7,4′-tetraoxyflavone) combined in the form of a glycoside.

1582. Carruthers, W., and Plimmer, J. R.
Sterols in green tobacco leaf.
Chem. Ind. Lond., 1959, No. 2, pp. 48-9.

Extracts of freshly harvested leaves of Delcrest tobacco from Rhodesia yielded stigmasterol, β-sitosterol and small amounts of 2 other compounds which may have been γ-sitosterol and β-sitostanol.—Med. Res. Coun., Univ. Exeter.

Diseases and pests.

(*See also* 1598c, d, f, h, o, q.)

1583. Bradley, R. H. E., and MacKinnon, J. P.
Effects of trichothecin on some viruses transmitted by aphids.
Canad. J. Microbiol., 1958, **4**: 555-6.

Using methods described previously [*H.A.*, 27: 3649], a 3% solution of trichothecin was sprayed onto burley tobacco plants about 2 hours before aphids carrying virus diseases were placed on them. The treatment resulted in striking reductions in the numbers of plants that became infected with henbane mosaic and tobacco etch but only in a slight reduction in the incidence of cucumber mosaic. Where plants of *Physalis floridana* were similarly treated with 25% trichothecin, both before and after aphid inoculation, reductions occurred in the incidence of potato Y and turnip-latent viruses but not of potato leaf-roll.—Ent. and Plant Path. Labs, Fredericton, N.B.

1584. Cameron, D. R.
Mosaic tolerance in *Nicotiana tabacum.*
Amer. J. Bot., 1958, **45**: 564-6, bibl. 7.

A study of the mosaic tolerance of *N. tabacum* var. Ambalema when introduced into Red Russian tobacco is reported. The amount of TMV present in the plants was determined and compared with that of Ambalema, Colombian M.T. and susceptible Red Russian. Attempts to localize the factors (mt_1 mt_2) in specific *tabacum* chromosomes were only partially successful. [From author's summary.]—Univ. Calif., Berkeley.

1585. Elbertzhagen, H.
Ein Beitrag zum Stickstoff- und Phosphatstoffwechsel mosaikviruskranker Tabakpflanzen. **(On the nitrogen and phosphate metabolism of tobacco plants infected with mosaic virus.)** [English summary 18 lines.]
Phytopath. Z., 1958, **34**: 66-82, bibl. 28.

The leaves of infected plants had higher contents of dry matter, total and soluble nitrogen, nucleic acids and protein. They also showed increased respiration activity and an increase at first in photosynthetic activity. Total phosphate showed no significant increase, and soluble phosphate was considerably lower than in the healthy controls. These results are attributed to increased metabolic activity due to the virus infection, which results in an intensified synthesis of protein and nucleic acids.—Univ. Munich and Bayer. Landesanst. PflBau PflSchutz.

1586. Panzer, J. D.
The effect of pre-inoculation temperature on test plant susceptibility to alfalfa and tobacco mosaic viruses.
Phytopathology, 1958, **48**: 550-2, bibl. 10.

Keeping French bean plants at high or low temperatures for 2 hours prior to their inoculation with AMV or TMV tended to increase their resistance to virus infection in comparison with plants held at moderate temperatures. However, when plants of *Nicotiana tabacum* and *N. glutinosa* were similarly treated for 2 or 6 hours no change in susceptibility to TMV occurred. In the case of the bean plants the resistance imposed by temperature treatments was short-lived. The data indicate that the temperatures affected the condition of the plant and not the viruses.—S. Dak. St. Coll., Brookings.

1587. Benda, G. T. A.
The introduction of tobacco mosaic virus into single hair cells of *Nicotiana langsdorfii* leaves. II. The effect of ribonuclease.
Virology, 1958, **6**: 718-24, bibl. 4.

The enzyme, pancreatic ribonuclease, was used as inhibitor in experiments in which it and the green aucuba strain of tobacco mosaic virus were introduced into the same or neighbouring cells of an epidermal hair of *Nicotiana langsdorfii* leaves. The enzyme inhibited lesion formation if introduced into the inoculated cell before or shortly after the virus, and when introduced in a mixture of virus and inhibitor. The enzyme also prevented lesion formation when introduced into a cell through which the virus must pass to reach the leaf from the inoculated cell. [Author's abstract.]—Univ. Calif., Berkeley.

1588. Wittmann, H. G.
Untersuchungen über die Wirkung des Cytovirins auf Virusvermehrung und Wirtswachstum. **(Studies on the effect of Cytovirin on virus multiplication and the growth of host plants.)** [English summary 6 lines.]
Phytopath. Z., 1958, **34**: 221-7, bibl. 4.

Multiplication of tobacco mosaic virus in tobacco plants was prevented by Cytovirin only when the concentration of the antibiotic reached almost toxic levels. At lower dosages the time of application of the chemical, before or after inoculation, determined the length of the period during which the appearance of symptoms was delayed.—Max-Planck-Inst. f. Biol., Abt. Melchers, Tübingen.

1589. Garber, E. D., and Heggestad, H. E.
Observations on the pathogenicity of biochemical mutants of *Pseudomonas tabaci*
Phytopathology, 1958, **48**: 535-7, bibl. 11.

Certain bacteria produce biochemical mutants which require specific amino acids for growth. This paper records observations on the resistance or susceptibility of 20 varieties of *Nicotiana tabacum* and of 10 other species of *Nicotiana* to 5 biochemical mutants and to the parental isolate of *Pseudomonas tabaci*. The species *N. longiflora*, *N. repanda* and *N. rustica brasilia* and the tobacco varieties Burley 21, Bel 6-62 and Bel 248C-2D were resistant to all the biochemical mutants as well as to the parental wildfire isolate. Only one mutant, which required leucine, was pathogenic for any variety of *N. tabacum*. The most susceptible species was *N. glutinosa*, which reacted to 4 out of the 5 mutants.—Univ. Chicago, Ill., and U.S.D.A., Beltsville, Md.

1590. McLeod, A. G., and Thomson, R.
The effect of several fungicides on stem rot of tobacco.
N.Z. J. agric. Res., 1958, **1**: 866-73, illus.

Ferbam, thiram and dichlone, at 2 lb., 1 lb. and ½ lb. per 100 gal. respectively, all gave good control of stem or collar rot of seedlings caused by *Sclerotinia sclerotiorum* and *Botrytis cinerea*. The fungicides were added to the water applied to the seedlings during transplanting.—Tobacco Res. Stat., D.S.I.R., Motueka.

1591. Chamberlin, F. S., and Dutky, S. R.
Tests of pathogens for the control of tobacco insects.
J. econ. Ent., 1958, **51**: 560.

Results, showing varying degrees of promise, are given of preliminary tests on the biological control of several tobacco pests in the insectary and of tobacco budworm (*Heliothis virescens*) in the field.—Ent. Res. Div., U.S.D.A.

Curing and fermentation.

(*See also* 1598j, n.)

1592. Street, H. K.
New machine spears binder leaf plants.
Tobacco, N.Y., 1958, **147** (17): 18, illus.

A prototype machine is briefly described which will spear the crop from 4½ acres in a day under ideal conditions. The spearing mechanism consists of 6 sets of fingers, powered by compressed air, which hold the plants as the spear points are driven through. Three men feed the machine, one drives it and one removes the filled laths. Hand spearing the same quantity of leaf would need 14 men.

1593. Sastry, A. S., and Bhat, N. R.
Water culture improves grades of top leaves in flue-cured tobacco.
Sci. and Cult., 1958, **24**: 233-4, bibl. 2.
Idem. Popular summary.
Indian Tobacco, 1958, **8**: 157.

Top leaves of Chatham tobacco were kept with about 1 in. of their leaf bases under distilled water for 6 and 24 hours, respectively, in 2 experiments. The water content of the leaves was thereby increased, and, when cured, their colour was better than that of control leaves that had been cured immediately after picking. It is suggested that water facilitates chlorophyll hydrolysis by enzymes.—Cent. Tob. Res. Inst., Rajahmundry.

1594. Johnson, T. W.
Scientists report progress in bulk-curing tobacco.
Tobacco, N.Y., 1958, **147** (21): 14, illus.

A barn, 10′×10′, accommodates the leaf on two levels and is equipped with a forced warm-air system. The tobacco is held compressed between rails bolted together and there is no necessity for stringing or looping on sticks. The time taken and quality are much the same as with conventional methods.

1595. Bartolucci, A.
Miglioramenti tecnici ed economici ad alcuni trattamenti termoigrometrici dei tabacchi in colli. (**Technical and economic improvements in thermo-hygrometrical treatments of baled tobaccos.** [English summary ½ p.]
Tabacco, 1958, **62**: 217-29, bibl. 5, illus.

The air-circulation and air-penetration systems are compared in detail. For bales with the optimal density of 222 kg. per cu. m., the process is 40 times as rapid with the second as with the first method, and is carried out by means of a rapid-depression stabilizer, the same apparatus being suitable for curing, disinfestation, pre-humidifying before blending, and aromatizing leaf and cut tobaccos. The cost of drying large quantities of tobacco is 62% less with the stabilizer than with the air-circulation method. [See also *H.A.*, 28: 2771.]

1596. Bartolucci, A.
La fermentazione extra stagionale come ultrasperimentato mezzo economico di miglioramento merceologico dei tabacchi orientali. (**Out-of-season fermentation as a fully tested economic means of improving the market quality of oriental tobaccos.**) [English summary ½ p.]
Tabacco, 1958, **62**: 230-44, bibl. 7.

The first large-scale artificial fermentation of Xanthi yakà tobacco was carried out over 9½ days at an average temperature of 41° C. and at an R.H. of approximately 70%. Because of the speed, it was relatively less costly than natural fermentation. The quality was improved by 30% and wastage was reduced by 6%. Strict control of absolute humidity during treatment proved essential. [See also *H.A.*, 28: 2771.]

1597. Giovannozzi, M.
Studi sulla fermentazione dei tabacchi. XVI. Prove di laboratorio per lo studio degli agenti determinanti la fermentazione del Kentucky per sigari "Toscani". (**Studies on tobacco fermentation. XVI. Laboratory experiments concerning the agents influencing fermentation of Kentucky for Toscani cigars.**) [English summary 8 lines.]
Tabacco, 1958, **62**: 117-23, bibl. 8, illus.

An apparatus is described, which serves for small-scale fermentation studies with about 30 g. of tobacco. Fermentation of Kentucky tobacco for cigar fillings was shown to be due to the yeast *Debaryomyces nicotianae* in conjunction with the bacteria *Micrococcus nicotianae*, *M. nicotianae* var. *liquefaciens* and *Bacillus* spp. The natural enzymes of the tobacco had little or no fermenting action.

Noted.

1598.
a Acosta J., R.
La capa del tabaco. (**Topping of tobacco.**)
Suelo Tico, 1958, **10**: 106-7, illus.
Practices recommended in Costa Rica.

b ANON.
Tobacco production in Dominica.
Windward Islands Annual 1958-59, 1958, pp. 27-9, illus.
A short popular account.

c ANTONIANI, C., FEDERICO, L., AND FLEISCHMANN, L.
Verwendung von Cosan-Netzschwefel ohne Beeinflussung der Zusammensetzung der Blätter von *Nicotiana tabacum*. **(Application of the proprietary wettable sulphur preparation Cosan without affecting the composition of tobacco leaves.)** [English summary 2 lines.]
Z. PflKrankh., 1958, **65**: 696-701, bibl. 1.
Used in tests against powdery mildew.

d BARTOLUCCI, A.
Il bromuro di etilene, quale rapido disinfestante integrale dei tabacchi in balle. **(Ethylene dibromide as a rapid and thorough disinfestant of baled tobacco.)** [English summary 9 lines.]
Tabacco, 1958, **62**: 124-32, bibl. 2.
Effective against *Lasioderma serricorne* in Turkish tobacco.

e BHAT, N. R., AND KRISHNAMURTY, I. V. G.
Unwanted types of flue-cured tobacco—a key to their identification.
Indian Tobacco, 1958, **8**: 162-8, illus.
Detailed comparison between 2 inferior types and Harrison Special and Chatham.

f CHILDS, D. P.
Warehouse fumigation of flue-cured tobacco with HCN to control the cigarette beetle.
J. econ. Ent., 1958, **51**: 417-21.
Lasioderma serricorne.

g GUTIERREZ, M. E.
Promising results of tobacco breeding in the Philippines.
Araneta J. Agric., 1958, **5** (3): 20-41, bibl. 14, illus.
Descriptions and illustrations of recent hybrids.

h HIRAI, T.
Intracellular evidence of the inhibition of tobacco mosaic virus multiplication by antiviral substances.
Virology, 1958, **6**: 732-42, bibl. 23.
Studies on the mechanism of inhibition by thiouracil and benzalacetonethiosemicarbazone. [See also *H.A.*, 28: 1602i.]

i INCEKARA, F.
How Turkish tobaccos are cultivated.
Tobacco, N.Y., 1958, **147** (21): 10-12.
The first of a series of articles on oriental tobaccos.

j (JOHNSON, W. H., HASSLER, F. J., AND HENSON, W. H., Jr.)
Tobacco bruises easily.
Agric. Res. Wash., 1958, **7** (4): 12, illus.
See *H.A.*, 28: 1596.

k KELLER, K. R.
Registration of tobacco varieties.
Agron. J., 1958, **50**: 712-13.
The first 10 varieties registered in the U.S.A. are described.

l PATEL, G. C., SINGH, M., AND DAS, R.
Hookah and chewing tobaccos of North Bengal. II. Marketing.
Indian Tobacco, 1958, **8**: 145-52, illus.
Including preparation, storage and bulking. [Part I was noted in *H.A.*, 29: 625j.]

m PATEL, M. S., PILLAI, P. N. B., AND THIAGARAJAN, D.
Tobacco in Mysore State.
Indian Tobacco, 1958, **8**: 128-37, illus., map.
Types, production and trade.

n ROWLAND, R. L.
Flue-cured tobacco. III. Solanachromene and α-tocopherol.
J. Amer. chem. Soc., 1958, **80**: 6130-3, bibl. 14.
Isolated from aged leaf in amounts of 0·05% and 0·01–0·02% of dry weight respectively.

o TIRELLI, M.
Notizie su un attacco di *Sclerotinia sclerotiorum* Lib. (Massee) al tabacco. **(Notes on an attack of *Sclerotinia sclerotiorum* on tobacco.)** [English summary ¼ p.]
Tabacco, 1958, **62**: 199-216, illus.
A severe attack in 1955 but not in 1956; probable causes discussed.

p U.S. DEPARTMENT OF AGRICULTURE.
Annual report on tobacco statistics 1957.
Statist. Bull. U.S. Dep. Agric., agric. Mktg Serv. **222,** 1958, pp. 70.
Acreages, production and trade in the U.S. and in certain other countries.

q WOLFFGANG, H., AND KECK, A.
Untersuchungen über den Stoffwechsel viruskranker Pflanzen. I. Die Phosphatase-Aktivität in *Nicotiana tabacum* L. var. Samsun nach Infektion mit TMV. **(Studies on the metabolism of plants affected by virus diseases. I. The phosphatase activity in *Nicotiana tabacum* var. Samsun following infection with TMV virus.)** [English summary ½ p.]
Phytopath. Z., 1958, **34**: 57-65, bibl. 14.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 1655a, i, m, n, q, s, w, 1872.)

1599. Zakopal, J., and Dlabola, J.
Pěnodějka obecná jako škůdce kmínu. **(The froghopper as a pest of caraway.)** [English, Russian and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd. Rostl. Výroba, 1958, **31**: 1019-24, bibl. 5, illus.

Philaenus spumarius was observed for the first time on caraway in Czechoslovakia in 1956. Its biology and the damage it causes are described. For control DDT or BHC (lindane), applied during the early stage of flower stalk development, is suggested.

1600. van Marle, G. S., and Luimes, B. J.
Kostprijsverlaging door arbeidsbesparing bij de teelt van witlofwortels. (**Reduction of production costs by labour-saving [methods] in the cultivation of chicory roots.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1958, **21**: 758-62, bibl. 1, illus.

Chicory roots were grown in rows spaced at 50 cm., using a pre-emergence mineral oil spray for weed control. Mechanical cultivation was used as much as possible. In a comparison with the normal cultivation method (rows spaced at 35 cm.) there was no difference in quality, and little difference in yield. Total labour requirements were reduced by 24%, and during May to July a reduction of 39% was obtained by using the wider spacing.—Rijkstuinbouwconsulentschap, Zutphen. [For an earlier report see *H.A.*, 28: 592.]

1601. Ihara, Y.
Studies on ginger. 1. Observations on some aspects of growth. [Japanese, with English summary 36 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 86-90, bibl. 8.

The author records his observations on the growth of ginger, noting that the growth of tuber is closely associated with that of the shoot. Planted in May in Japan growth remains low until July, reaching a maximum in August and September. It then slows down. The tuber continues growth even after the aerial parts have been killed by autumn frost. Generally speaking and apart from tubers formed after September, the later a tuber is formed the greater will be its ultimate size. Roots are mainly developed from primary tubers and less often from secondary and tertiary ones.

1602. Obolensky, G.
Influence des ultra-sons sur l'augmentation des taux de vanilline et d'oléoresines dans les gousses de vanille. (**The effect of ultrasonic waves on the increase of vanillin and oleo-resin contents of vanilla pods.** [English summary ½ p.]
Qual. Plant. Maveg., 1958, **5**: 45-63, bibl. 27.

The usual 3-min. hot water treatment of green vanilla pods at 63° C. was replaced by treatment with cooler water (25 or 40° C.), together with ultra-sonic radiation for 1–3 min. at different frequencies and intensities. The great majority of the treatments increased the yields of both vanillin and oleoresins. A modification of the standard method of determining vanillin is described, and a note is included on the preparation of vanilla pods for market.

Drug plants.

(*See also* 1624, 1630, 1655c-e, g, j, k, o, p, t.)

1603. Federation of Malaya and UNESCO.
Proceedings of the symposium on phytochemistry, Kuala Lumpur, December, 1957.
Publ. UNESCO Sci. Coop. Off. S.E. Asia, [1958], pp. xii+183, bibls.

The symposium is divided into two parts. The first (pp. 1–122) consists of reviews, with extensive bibliographies, of phytochemical surveys carried out in Australia, Hong Kong, India, Indonesia, Japan, Malaya, New Zealand, the Philippines and Viet-Nam. The second part (pp. 123-183) consists of 14 papers. Three of these are abstracted separately, and among the others are: The structure of avicennin, by H. R. Arthur; The constituents [notably essential oils] of *Phebalium nudum*, by L. H. Briggs and R. C. Cambie; Preliminary investigations of the C.N.S. action of some Indonesian *Rauwolfia* spp., by A. J. Darman; Optically active compounds of anacardiaceous exudates [notably oily exudates from *Campnosperma brevipetiolatum* and *C. auriculatum* which are being evaluated for use in fields similar to those where cashew shell oil is used], by H. H. Hatt; Chemical constituents of the plants of Coniferae and allied orders, by T. Kariyone; The isolation and separation of the alkaloids of *Kopsia singapurensis*, by A. K. Kiang and R. D. Amarasingham; Bis-coclaurine alkaloids from *Phaeanthus ebracteolatus*, by A. C. Santos; and Alkaloids of *Rauwolfia perakensis*, by A. S. C. Wan and A. K. Kiang.

1604. Bisset, N. G.
A phytochemical survey of some plants from the South Moluccas.
Proc. Sympos. Phytochem., Kuala Lumpur, 1957, pp. 125-40, bibl. 7.

During the course of a botanical expedition to the Babar and Tanimbar islands in the South Moluccas tests were made on some 150 species for the presence of alkaloids, saponins and essential oils and for bitterness. About 24% of the species gave positive reactions for alkaloids and 16% for saponins. The alkaloid bearing species included members of families not hitherto reported to contain alkaloids. Some regional and varietal differences in composition were encountered. For example, *Tylophora exilis* from one locality contained saponin and from another locality alkaloid. *Urena lobata* f. *viminea* contained essential oil whereas *U. l.* f. *sinuata* did not.—Treub. Lab., Kebun Raya Indonesia, Bogor.

1605. ALTMAN, R. F. A., AND DE SOUZA, H. B.
Estudos químicos de plantas amazônicas. **(Chemical studies of plants of the Amazon region.)** [English and French summaries.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 3-111, bibls, illus., [received 1958].

The paper consists of 6 sections, of which the first author contributes all except one: (1) Microchemical identification of alkaloids of the cinchona group. This describes the technique in detail, and its application to *Picrolemma pseudo-coffea* and *Strychnos pseudo-quina*. (2) Plants containing steroidal sapogenins. Determination of these compounds is described, and quantitative data are listed for 23 plant species, including 6 species of *Derris*. (3) Analysis of the latex of *Manilkara huberi*. Composition figures are included for this medicinal latex, of which one of the principal constituents is cinnamic acid. (3a) A brief technological study of balata [rubber] from *Manilkara huberi*. Balata prepared from the latex of this tree could be vulcanized after, but not before, purification. (4) "Ant cotton", *Parinarium rudolphii*. The cottony hairs from the leaves of this plant are extensively collected by ants. Analysis showed that they contained water repellent substances. (6) Seeds of açaí (*Euterpe oleracea*). Seeds collected after using the fruits of this palm for making a beverage were examined for possible use as fodder or manure, but proved suitable for neither.

1606. ANZALDO, F. E., MARAÑON, J., AND ANCHETA, S. F.
Screening of Philippine plants for steroidal sapogenins. II.
Philipp. J. Sci., 1957 (issued 1958), **86**: 233-9, bibl. 7.

Analyses were carried out on 172 samples of leaves, stems, bark, roots, flowers or fruits of 99 species belonging to 17 families. Crude sapogenin acetates were isolated from 53 alcoholic extracts, and 27 samples gave characteristic spectral curves of steroidal sapogenins. Among samples giving positive results were stems of *Avicennia officinalis*, *Bixa orellana* and *Vitex negundo*, fruit of *Capsicum annuum* var. *longum* and leaves of *Melia azedarach*. Negative results were obtained with all plant samples of the families Araceae, Gramineae, Palmae, Sapotaceae and Tileaceae. [For Part I see *H.A.*, 28: 594.]—Inst. Sci. Tech., Manila.

1607. PEREPEČKO, N. P.
Heat treatment of *Ammi visnaga* seeds. [Russian.]
Agrobiologija, 1958, No. 5, pp. 137-8.

Seeds treated at 20–40° C. for 30–40 days germinated better, both in the laboratory and field, than those stratified or not treated before sowing. Stratification for 10 days or pre-germination in addition to heat treatment improved germination further, especially when the seeds were subsequently sown direct in the field.

1608. DELTSCHEFF, G.
Eine hochalkaloidhaltige Belladonnaart. **(A high alkaloid containing belladonna variety.)**
Pharmazie, 1957, **12**: 686-90, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 38,552.

In 1944 in Greece a yellow-flowered wild plant, which was apparently a *Datura* hybrid, was found to contain 0·96% alkaloids in the fruit and 1·12% in the leaves. Descendants of this plant produced flowers ranging in colour from yellowish-brown to violet. The yellow-flowered plants were much richer in alkaloids than the others, and selections have been obtained with leaves containing 0·898% alkaloids compared with an average of 0·307% in ordinary wild belladonna plants. Reference is also made to another belladonna selection made in 1954–55, the leaves of which contained no less than 2·6% alkaloids.—Inst. Plant Breed., Sofia.

1609. SOMERS, E. B., AND GUTH, E. P.
Extraction of constituents of lyophilized *Atropa belladonna*.
J. Amer. pharm. Ass., sci. Ed., 1957, **46**: 55-7, from *Biol. Abstr., Sect. D*, 1958, **32**. Abstr. 38,575.

A study of lyophilization as it affects the extraction of the alkaloids, chlorophyll A and B, tota extractive, total nitrogenous extractive and soluble carbohydrates of *Atropa belladonna* L. was made The leaves that were lyophilized were frozen at the moment of collection so as to retard any possible enzymatic reactions. The results show tha lyophilization of *Atropa belladonna* leaves does no affect the amount or rate of extraction of alkaloids but the amount of total extractive, soluble nitrogenous material, soluble carbohydrate, and the quality of chlorophyll are affected. [Authors abstract.]

1610. VIDAL, P., AND BONNET, P.
Fertilisation des *Cinchona ledgeriana* Moen en pépinière et en plantation à Sérédou Premiers résultats. **(Manuring of *Cinchona ledgeriana* in the nursery and in the field a Sérédou. Preliminary results.)** [English and Spanish summaries ¼ p. each.]
Agron. trop., 1958, **13**: 429-47, bibl. 5.

The results of fertilizer experiments in mountainou S.E. Guinea are described. In the nursery 2N+1 increased growth and percentage establishment N at 1·2 g. and K_2O at 0·6 g. per plant wer applied in 4 doses, the first 15 days after transplanting and the remainder at 45-day intervals spraying being preferable to spreading. Two field experiments are described in which complete N+P+K fertilizer increased bark yield and quinine content. The quantities applied in the first trial were 50 g. ammonium sulphate plus 20 g. each of hyperphosphate and potassium chloride per tree per annum and, in the second, 40 and 30 g. respectively. The N was applied in half doses 6 months apart.

1611. DEAN, B. M., AND WALKER, J.
A new source of bergenin.
Chem. Ind. Lond., 1958, No. 51, pp. 1696-7, bibl. 8.

An infusion of the bark of the tauroniro tree, *Humiria balsamifera*, is reputed in British Guiana to have a therapeutic effect in amoebic dysentery. Extraction of the powdered bark has yielded a substance identified as bergenin, but, as tests have shown bergenin at 0·1% to be inactive against amoebic bacteria, it would seem that such therapeutic action as taurinora bark may possess probably depends on some other constituent.—Nat. Inst. med. Res., Mill Hill, London.

1612. NAPP-ZINN, K.
Vernalisation und Thermoperiodismus. (**Vernalization and thermoperiodism.**) [English summary 12 lines.]
Planta, 1958, **52**: 230-4, bibl. 7.

Plants of a biennial strain of *Hyoscyamus niger* were vernalized at 2–3° C. for 17, 31 or 48 days, or were exposed for 48 days to alternating temperatures of 2–3° C. for 16 or 8 hours each day and of 20° C. for the remainder of each day. The vernalizing effect, as revealed by the date of shooting, was greatest following 48 days at 2–3° C., less following 31 days at 2–3° C., and less again following 48 days of alternating temperature in which 16 hours a day were at 2–3° C. The other two treatments had very little effect. These results do not give any hint of a connexion between vernalization and thermoperiodism. In contrast to the date of shooting, the date at which flowering started was partly dependent on the size of the plants at the time when cold treatment was started.—Univ. Köln.

1613. MESTENHAUSER, A.
Zur Methodik der Neuanlage von Alantkulturen. (**Methods of propagating *Inula helenium*.**)
Pharmazie, 1957, **12**: 431-2, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 38,565.

The yield of roots from plants propagated from crown root cuttings was almost as high as that of plants raised from seed. The root systems of the vegetatively propagated plants were much shallower than those of the seedlings, and this greatly facilitated harvesting and cleaning of the roots.—Czech. Acad. agric. Sci. Exp. Stat., Opava.

1614. ČEVRENIDI, S. H.
A new effective source of saponins from the flora of Central Asia. [Russian.]
Izv. AN UzSSR, 1956, No. 8, pp. 95-7, from *Ref. Ž. (Biol.)*, 1958, No. 4, Abstr. 15,878.

The tubers of *Leontice ewersmannii*, which weigh up to 500 g., contain the alkaloids leontamine, leontidine and leontine, about 30% starch, 45·9–72·5% moisture and up to 38·5% saponins. Saponins were absent from the aerial parts of the plant.

1615. ILINSKAYA, T. N., AND YOSIFOVA, M. G.
Influence of the conditions under which the poppy is grown on the alkaloid content of the opium obtained. [In English.]
Bull. Narcotics, 1956, **8** (3): 38-41, from *Ref. Ž. (Biol.)*, 1958, No. 1, Abstr. 1,799.

Three varieties of opium poppy were grown in 8 different places in the U.S.S.R. over a number of years, and the alkaloids in the opium were determined. The morphine content decreased from south to north, and the codeine and total alkaloid contents in the reverse direction, but total alkaloid production was higher in the south due to higher opium yields. Ample moisture and optimum temperatures during the first half of the growth period encouraged morphine formation, and lower temperatures codeine formation. Low humidity with high temperatures stimulated the accumulation of papaverine, whereas at low temperatures and high humidity none was formed.

1616. BREKKE, O. L., AND OTHERS.
Morphine extraction from domestically grown opium poppy.
J. agric. Food Chem., 1958, **6**: 927-9, bibl. 16.

A process was developed to recover crude morphine liquor from mature, domestically grown, opium poppy plants. Over 95% of the morphine was extracted from meal with water-saturated isobutylalcohol in a continuous countercurrent extractor. In preparing the meal, stems and seed were separated from capsular material by a four-step, size-reduction procedure with a 6% loss of morphine. Morphine concentration in the meal was increased from 0·5 to 0·7%. An aqueous ammonia treatment of the meal prior to extraction liberated the alkaloids from their naturally occurring salts. Poppy meal or straw keeps in dry storage without any morphine loss. [From authors' abstract.]—North. Utiliz. Res. Develop. Div., U.S.D.A., Peoria, Ill.

1617. HOFMANN, A., AND OTHERS.
Psilocybin, ein psychotroper Wirkstoff aus dem mexikanischen Rauschpilz *Psilocybe mexicana* Heim. (**Psilocybin, an hallucinogenic substance from the Mexican mushroom, *Psilocybe mexicana*.**)
Experientia, 1958, **14**: 107-9, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 35,161.

The active principle of *Psilocybe mexicana*, a Mexican mushroom with hallucinogenic properties, has been isolated in crystalline form. The compound has been given the name psilocybin; it possesses indole characteristics and contains phosphorus. A second substance, closely related to psilocybin but found only in traces, has been called psilocin.

1618. SNIECHOWSKA, K.
Biologia rozwoju lulecznicy himalajsjiej (*Scopolia lurida* Dum.). (**Biological aspects of the development of *Scopolia lurida*.**) [Russian and German summaries.]
Biul. Pánstw. Inst. Nauk. leczn. surow. Rośl. Poznaniu, 1956, **2** (3): 153-9, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,877.

In artificial pollination trials the best results were obtained by pollinating *Scopolia* flowers in the early stages of development. Seed thus obtained showed 90% germination.

1619. SEKULIĆ, M., AND PETKOVIĆ, D.
Studies on *Scopolia carniolica* found in eastern Serbia. [Yugoslav, with German summary ½ p.]
Zborn. Rad. poljopriv. Fak. Belgrade, 1958, **6** (1): 187-96, bibl. 22, illus.

The rhizomes contained more alkaloids than either the leaves or the stems, but in the leaves scopolamine predominated and only traces of atropine (hyoscyamine) were found.

1620. ALLEN, E. F.
Notes on the cultivation of *Rauwolfia* in Malaya.
Malay. agric. J., 1958, **41**: 100-5, bibl. 5, illus.

Descriptions are given of *Rauwolfia serpentina* and the indigenous species *R. perakensis*. Cultural trials, which are described, have shown that both species are easy to grow on well-drained soil. Yields of roots so far recorded appear to be satisfactory. The snag is that there is no commercial demand for roots of *R. perakensis* and that the market for roots of *R. serpentina* has become saturated.

1621. CHATTERJEE, A.
Studies on the alkaloids of some apocynaceous plants.
Proc. Sympos. Phytochem., Kuala Lumpur, 1957, pp. 142-5, bibl. 11.

Data are provided on the alkaloids identified in 8 species of *Rauwolfia*. The alkaloids so far isolated can be grouped into 4 classes and 2 types according to their basic ring structures. Preliminary results of similar investigations on species of *Alstonia*, *Kopsia* and *Vinca* are mentioned briefly.—Univ. Coll. Sci., Calcutta.

1622. MÜLLER, J. M.
Über die Alkaloide von *Rauwolfia ligustrina* R und S. Raugustin, ein neues reserpinähnliches Alkaloid. (**The alkaloids of *Rauwolfia ligustrina*. Raugustine, a new reserpine-like alkaloid.**)
Experientia, 1957, **13**: 479-81, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 35,164.

Twenty-one alkaloids have been identified from the root of *Rauwolfia ligustrina*. The more important ones are reserpine, pseudoreserpine and raugustine, a new base which is isomeric with pseudoreserpine. The structure of the latter compound is discussed.

1623. DĘBSKA, W., SZPUNAR, K., AND ZAJĄCZKOWSKI, J.
Wyniki obserwacji plantacji kozłka lekarskiego w 1955 roku. (**Results of observations on plantations of medicinal valerian in 1955.**) [Russian and German summaries.]
Biul. Pánstw. Inst. Nauk. leczn. surow. Rośl. Poznaniu, 1956, **2** (3): 164-71, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,879.

The work was conducted on 14 plantations in different parts of Poland on three varieties of *Valeriana officinalis*, namely *latifolia*, *tenuifolia* and *media*. Under unfavourable spring, but favourable summer and autumn, conditions the yield of seeds amounted to 200 kg./ha. and that of roots to 2,350 kg./ha. Essential oil content ranged from 0·25 to 1·25% and its biological activity from 1,095 to 1,492 units. No relationship was found between the content and biological activity of the essential oil.

Essential oils.

(*See also* 1604, 1655f, r, u.)

1624. TUCAKOV, J.
Plantes médicinales et aromatiques de sables de Danube (Déliblato) en Yougoslavie. Importance économique. Possibilité de culture. (**Medicinal and aromatic plants of the Danube sands near Déliblato in Yugoslavia. Economic importance and possibilities of cultivation.**)
Qual. Plant. Maveg., 1958, **5**: 108-20, bibl. 7, illus.

Trials lasting 7 years showed that resistance to drought, wind and blown sand was highest in hyssop, *Gypsophila paniculata*, pyrethrum (*Chrysanthemum cinerariifolium*), calamint, *Salvia officinalis*, *Glycyrrhiza glabra* and lavender, but relatively low in peppermint, *Althaea officinalis* and balm (*Melissa officinalis*). Essential-oil contents were increased by planting shelter belts of trees or cereals. The plants grown on these sands flowered 10–20 days later than those grown on neighbouring soils of the chernozem type, but root development was greater in the sandy soils. This was very evident in *Gypsophila paniculata*, in which the large, straight roots from sandy areas were of high commercial value, whereas the small, knotted ones from clay soils were useless. Fennel and coriander grown on the sands were richer in essential oils than when grown elsewhere, and peppermint on the sands was immune from *Puccinia menthae*.—Univ. Belgrade.

1625. COCKER, W., AND OTHERS.
The volatile oils of *Artemisia brevifolia* and *kurramensis*.
J. Sci. Food Agric., 1958, **9**: 828-36, bibl. 53.

The two oils each contain small quantities of carboxylic acids with 4–7 carbon atoms, as well as camphene, cineole, thujone and (—)-camphor. *A. brevifolia* also contains *p*-cymene and possibly α- and β-thujaketonic acids. [Authors' abstract.] The authors also provide a table showing the constituents found in the oils of many *Artemisia* spp., as reported in the literature.—Trinity Coll., Dublin.

1626. GREEN, R. J., Jr.
"Deep plowing" for controlling *Verticillium* wilt of mint in muck soils.
Phytopathology, 1958, **48**: 575-7, bibl. 2, illus.

Preliminary results obtained in 1956 on the use of deep ploughing to control *Verticillium albo-atrum* in peppermint fields have already been reported [*H.A.*, 28: 610]. This paper presents results obtained in 1957, which confirm the good effects of deep ploughing in reducing infection. In 1957 row mint (1st year crop) showed 72·6% infection on land ploughed 6–8 in. deep and only 8·6% infection on land ploughed 28–30 in. deep; the yield of oil was doubled by deep ploughing. Meadow mint (2nd year crop) showed 85·0% infection and yielded 26·5 lb. oil/acre following shallow ploughing compared with 10·2% and 38·9 lb. following deep ploughing.—Purdue Univ., Lafayette.

1627. CORBETT, R. E., AND GRANT, P. K.
The volatile oil of *Pseudowintera colorata*. I.
J. Sci. Food Agric., 1958, **9**: 733-9, bibl. 20.
CORBETT, R. E., AND SPEDEN, R. N.
Idem. Part II. The structure of *cyclo*colorenone.
J. chem. Soc. Lond., 1958, pp. 3710-15, bibl. 19.

The leaves and terminal shoots of the New Zealand pepper tree, *Pseudowintera colorata*, yield an essential oil, which has been shown to contain at least 30 constituents. Sixteen of these fractions have so far been identified. One of them, eugenol, is present in sufficient quantity to account for the hot taste of the oil. Part II is concerned with the chemistry of one constituent, a sesquiterpine ketone, *cyclo*colorenone.—Univ. Otago, Dunedin, N.Z.

1628. FELKLOVÁ, M.
Der Gehalt an ätherischem Öl bei *Satureja hortensis* L. im Verlauf der Vegetationszeit. **(The volatile oil content of *Satureia hortensis* during the course of the vegetative period.)**
Pharmazie, 1958, **13**: 148-50, bibl. 15, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 41,936.

Peaks in the essential oil content of summer savory, amounting to 0·97–0·98% of dry herb weight, occurred at two stages of growth, viz. in young plants at the beginning of the main vegetative growth phase and again just before the first flower buds opened. The content was at a minimum at the time of flower bud formation, which occurred when vegetative growth ceased. Tests on extracts from the herb failed to reveal any antibacterial properties.—Pharm. Fakultat, Brno, Czech.

Fibres.

(*See also* 1655b.)

1629. GODNEV, T. N., AND STASENKA, N. N.
The effect of light regime and related factors on the growth and development of hemp (*Cannabis sativa*). [White Russian, with Russian summary.]
Vesci AN BSSR. Ser. bijal. N., 1956, No. 4, pp. 77-8, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,891.

Hemp seed at 120 kg./ha. was sown in rows 8, 16 and 50 cm. apart and in 16-cm. wide bands 50 cm. apart. Photometrical measurements showed that widening the interrows increased the illumination of plants, but the greater density within the rows altered growing conditions. To remove these side effects the sowing rate was reduced and the plants were shaded with cheese cloth. The different spacings had a marked effect on the temperature, water and light regimes of the plants. High light intensities increased vigour and chlorophyll content, but, although the vegetative mass more than doubled, the fibre content and quality declined. At dense (narrow row or band) sowing the fibre content increased and its quality was good.

1630. KREJČÍ, Z.
Hanf (*Cannabis sativa*)—antibiotisches Heilmittel. II. Methodik und Ergebnisse der bakteriologischen Untersuchungen und vorläufige klinische Erfahrungen. **(Hemp (*Cannabis sativa*), an antibiotic medicinal plant. II. Methods and results of bacteriological investigations and preliminary clinical findings.)**
Pharmazie, 1958, **13**: 155-66, bibl. 44, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 41,940.

In the course of a survey of central European plants for antibacterial constituents, hemp was found to contain substances possessing high activity. These substances are associated with the resins and are best extracted with ethanol, petroleum ether and benzene. This paper describes chemical and bacterial investigations designed to separate and purify the active components of hemp extracts.—Univ. Palacky, Olomouc, Czech.

1631. Nur, N.
Observasi pada *Musa textilis* Née. Bagian pertama. Tjatatan^2 mengenai biologi bunga. **(Observations on *Musa textilis*. Part I. Notes on floral biology.)** [English summary 2½ pp.]
Pemb. Balai Besar Penjelidikan Pertanian* **151, 1958, pp. 115, bibl. 57, illus.

This publication describes the flowers, factors affecting blooming, the receptiveness of the stigma, and pollination (cross pollination is effected by a small bat (*Macroglossus minimus*). The observations are set out in 30 tables, all of which have English headings.

1632. Carangal, A. R., Jr., Tucay, E. A., and Bernardo, F. A.
Biochemical studies on abacá mosaic and bunchy-top viruses: III. Organic acids and mosaic virus infection.
Philipp. Agric., 1958, **42**: 129-33, bibl. 4.

Although the leaves of certain species which are resistant to the disease have greater oxalic acid contents than other species which are susceptible, the introduction of oxalic acid into *Musa textilis* plants failed to inhibit the virus, nor did infection alter the level of organic acids in the leaves of *M. textilis*. It is therefore suggested that the oxalic acid content is not related to resistance. [For Part II, see *H.A.*, 27: 638.]

1633. Bemelmans, J.
Phormium tenax Forster. Culture et industrialisation. **(The cultivation and processing of New Zealand flax.)** [English summary ¼ p.]
Ann. Gembl., 1957, **63**: 211-39, 297-322, bibl. 11 pp., illus.

This is a very full account of the crop, its botany, cultivation, manufacturing processes, and pests and diseases. Included are the results of fertilizer experiments, chemical analyses of different parts of the plant, notes on varieties, yield data, descriptions of decortication methods and data on the physical properties of the fibre.

Hops.

1634. Hudson, L. E.
Hop evaluation and utilization. I. Hop evaluation. [French, Spanish and German summaries 1¼ pp. each.]
Wallerstein Lab. Commun., 1958, **21**: 183-205, bibl. 10.

Investigations aimed at formulating a system of hop evaluation, based on the direct effects of hops on beer, are described. Taste testing proved insufficiently sensitive. On the assumption that the same components are responsible for both the bittering and preservative effects of hops, the bacteriostatic activity of hops was investigated. This provided a method of determining the effect of variations in the hopping rate on the "acidity life" or biological stability of beer. Experiments following this procedure have established that for hops of any one variety the "soft resins content" alone provides an adequate evaluation of fresh hops. In stored hops allowance must be made for a steady decline in stabilizing activity. Taking Fuggles as the standard hop variety, other varieties submitted to brewing tests showed consistently different biological stabilities. From this a "soft resins factor" was introduced, which represented the ratio of the stabilizing effect of a given variety to a unit value arbitrarily assigned to Fuggles. For varieties of practical importance the "soft resins factor" was found to lie in the range of 0·9 to 1·3. The importance of humulones and their derivatives to the biological stability of beer was also confirmed by extensive investigation of different hop varieties. Among these cohumulone appears to play a particularly significant part in the development of stability, and it is suggested that this should be taken into account in the analytical evaluation of new hop varieties. The application of the "soft resins factor" concept to the seasonal evaluation of hop samples is among other aspects discussed.—Arthur Guinness Ltd., Dublin.

1635. Isebaert, L.
α-Acids in green hops.
Int. Tijdschr. Brouw. Mout., 1958/59, **18**: 1-3, from abstr. in *J. Inst. Brew.*, 1958, **64**: 511.

In an attempt to estimate the optimum time for picking different varieties of hops, determinations of α acid contents were made by a rapid conductometric method at intervals over the period 26 August to 19 September, 1957. Infra-red radiation was used to dry the green hops for determination of moisture contents. The α acid content of Northern Brewer reached a maximal value on 2 September, while the highest values for Hallertau and Saaz varieties were not attained till 12 September and, with all varieties, α acid content increased after a sunny day and diminished after a day without sun. In general, hop growers tend to begin picking too early.

Insecticidal plants.

(*See also* 1605, 1655h.)

1636. Jacobson, M.
Insecticides from plants: a review of the literature, 1941-1953.
Agric. Handb. U.S. Dep. Agric. **154,** 1958, pp. 299, bibl. 236.

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*A continuation of *Contr. gen. agic. Res Stat., Bognor.*

This useful publication is a successor to "Plants of possible insecticidal value, a review of the literature up to 1941" by N. E. McIndoo. In all, 3,111 species, grouped by families, are listed, with brief notes on the effects, whether positive or negative, of extracts from them on various insects. The established plant insecticides such as pyrethrum and nicotine are not included. A full index of plants makes it easy to trace the work done on each species.

Rubber plants.

1637. Wisniewski, A.
Borrachas amazônicas pouco conhecidas. **(Little known rubber plants of the Amazon region.)** [French summary 1 p., English ¾ p.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 301-9, bibl. 8, [received 1958].

Micrandra spp. give low yields of high quality rubber. *Perebea guianensis* rubber is of good quality, but not yet economically important. Rubber from *Zschokkea* sp. is highly resinous and poor in quality, but the latex of this species is used in some Amazon areas to adulterate hevea latex. *Landolphia* spp. are important rubber plants in Africa, but the two Amazon species give very low latex yields.

1638. de Souza, H. B.
Latex de *Landolphia paraensis*. **(Latex of *Landolphia paraensis*.)** [English and French summaries ½ p. each.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 113-26, bibl. 10, illus., [received 1958].

The rubber obtained from the latex of this plant is high in resin content and low in total solids and hydrocarbons. At present its industrial value is negligible, but genetical studies and selection are advocated.

1639. Kalantyr', M. S.
The gutta-productivity of *Eucommia* plantations. [Russian.]
Sb. Rabot po lesn. h-vu Vses. n.-i. In-t Lesov. i meh. lesn. H-va, 1956, No. 32, pp. 141-7, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,899.

In the southern subtropical regions the greatest increment of gutta-bearing tissue in *Eucommia* occurs when plants are 3–4 years old. Under commercial conditions the annual yield of gutta from leaves amounts to 100–120 kg./ha. Planting density should not be greater than 5–10 thousand plants/ha., and the plantation can be cropped for more than 20 years. Application of NP increased the yield of leaves by 40–70%. Liming of acid soils improved the effectiveness of mineral fertilizers.

1640. Soukup, I.
The propagation and cultivation of *Eucommia ulmoides*—the gutta percha source of the temperate zone. [Russian, with English and German summaries.]
Za soc. s.-h. Nauku, 1957, **A6** (1): 55-104, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,898.

In 1953 at Pruhonice, Czechoslovakia, trials were conducted on the vegetative propagation of *Eucommia* with the aid of growth substances. Growth substances and environment (moisture and temperature) and the maturity of shoots affected the formation of adventitious roots. The highest percentage of rooting was obtained with cuttings planted on 29 May, while only half as many planted on 12 and 26 June rooted. Cuttings from the basal end of the shoot rooted better when planted early, but when planting was delayed those from the apical end rooted better. A mixture of IAA and IBA gave the highest percentage of rooting and a mixture of IBA and nicotinic acid was also very satisfactory. The controls did not root. When layering was tried the lower branches rooted the best. *Eucommia* was also propagated by budding, to obtain female plants, and by seed. The average gutta content of the leaves of seedlings was 2·6%, of plants from layers 1·66% and of mature bushes 2·18%. Corresponding figures for the bark of shoots were 2·25, 2·60 and 1·96% respectively.

1641. Wisniewski, A.
Observaçoes sôbre a borracha do gênero *Sapium*. **(Observations on rubber from the genus *Sapium*.)** [French summary 1½ pp., English 1¼ pp.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 289-99, bibl. 8, [received 1958].

Trees of *Sapium* spp. in Brazil have not been exploited to the same extent as those in Colombia and British Guiana. Most species have too hard a bark to be tapped in the same way as hevea, but one (not specified) has soft bark and yields well. Properties are compared for hevea and *Sapium* rubbers.

1642. Januševič, Z. V.
Changes in the shape and structure of the root of *Taraxacum kok-saghyz* induced by environmental conditions. [Russian.]
Bot. Žurnal, 1958, **43**: 1278-92, bibl. 18, illus.

Since leaf development, by influencing the vascular and meristematic tissues of the root, determines its development, environmental conditions which affect leaf growth also affect root structure and size. Chief among such conditions are increased living space in the early stages, which encourages root branching and the rosette formation of leaves, and high rates of fertilizers, especially N, which increase leaf area. Through mass selection changes induced by altered environment are retained in the seed progeny.

1643. VYVAL'KO, I. G., AND OTHERS.
Carbon dioxide formation in the leaves of kok-saghyz from sugars and acids containing labelled carbon. [Russian.]
Bjul. Fiziol. Rast., 1957, No. 1, pp. 15-19, from *Ref. Ž.* (*Biol.*), 1958, No. 1, Abstr. 1,142.

Solutions of sugars and of the sodium salts of organic acids containing C^{14} were applied to the leaves of kok-saghyz. Considerable quantities of $C^{14}O_2$ were evolved 2–3 hrs after treatment, and during the 5–6 days following applications of saccharose-C^{14}, α-glucose-1-C^{14}, acetic acid-1-C^{14}, pyruvic acid-2-C^{14}, levulinic acid-1-C^{14}, levulinic acid-C^{14} and glycine-1-C^{14} more than 50% of the introduced C^{14} was liberated in the dark. Of applied α-fructose-1-C^{14} and α-gluconic acid-1-C^{14} only 25% of the C^{14} was lost. From levulinic acid-C^{14} and pyruvic acid-1-C^{14} 20–33% more $C^{14}O_2$ was liberated in light than in darkness, whereas with the other compounds the differences were insignificant.

Seed oils.

(*See also* 1655 l, v, 2009.)

1644. PEREIRA PINTO, G.
Contribuição ao estudo químico do óleo de andiroba. (**Contribution to the chemical study of andiroba oil.**) [English summary ½ p., French ¾ p.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 195-206, bibl. 6, [received 1958].

Composition data are given for the seed oil of the andiroba tree (*Carapa guianensis*). It is used as an ointment, and mixed with other vegetable oils in soap manufacture.

1645. RAUTOU, S.
Le ricin en France méridionale. (**The castor-bean plant in southern France.**) [English, German and Russian summaries ⅓ p. each.]
Ann. Amél. Plantes, 1958, **8**: 75-112, bibl. 42, illus.

In southern France early varieties (such as Anjou and Baker 1) matured secondary or tertiary branches of the inflorescence, whereas on late varieties (such as Conner and MC) only the primary flower stem developed. In a 4-year variety trial at Montpellier yields of 15 quintals per ha. were obtained from Conner and H-6 plants. Breeding of high-yielding varieties is in progress [see also *H.A.*, 29: 679o].—École nat. Agric., Montpellier.

1646. ĆOROVIĆ, M., AND ČANAK, M.
Dejstvo različitih doza x-zračenja na klijanje semena biljke *Ricinus communis* L. (**The effect of different doses of X-rays on the germination of castor bean seeds.**) [English summary 1 p.]
Arh. poljopr. Nauke, 1958, **11** (33): 24-33, bibl. 9, illus.

Seeds of the 1956 crop were subjected to X-ray treatments ranging in intensity from 50 to 200,000 r. The rate and percentage of germination were increased by irradiation, but with little correlation between these and the dosage, although subsequent development was definitely inhibited above 40,000 r. Morphological changes were observed in both aerial and root systems, and above 10,000 r., in addition to other alterations, the loss of chlorophyll in the cotyledons was such as to bring growth to a standstill. It is considered that doses of 50 r. and 400 r. would be suitable for stimulating germination and that one of 5,000 r. would be optimal for subsequent development.

1647. BHARUCHA, F. R., AND JOSHI, G. V.
A note on sugar metabolism in *Ricinus communis* Linn.
Sci. and Cult., 1958, **24**: 230, bibl. 6.

The sugars found in various parts of the plant were identified by paper chromatography. Sucrose, glucose and fructose were the major sugars, while rhamnose, xylose and raffinose occurred in trace quantities. The significance of the trace sugars is discussed.—Inst. Sci. and Wilson Coll., Bombay.

1648. BERNFELD, M., AND PAQUOT, C.
Effects d'injection d'huile d'arachide dans les canaux médullaires du ricin. (**The effects of injecting groundnut oil into the medullary canals of the castor plant.**)
Oléagineux, 1958, **13**: 869-72, bibl. 2.

Groundnut oil, injected into the hollow stem of castor plants, was translocated either to the tips of the shoots or to the surface of the internodes where oily swellings appeared. Chemical analysis, after 34 days, failed to recover the whole quantity of oil injected and thus provided evidence that the oil was partly metabolized by the plants.—Lab. Biol. vég. Sorbonne, etc.

1649. PEREIRA PINTO, G.
O ólea de uchí. (**Oil from uchí** [*Saccoglottis uchi*].) [English and French summaries ⅓ p. each.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 187-93, [received 1958].

The fruit has a comparatively low oil content, but the oil, of which the composition is reported, would serve the same purposes as olive oil or *Jessenia*-palm oil.

1650. Casier, J. P. J.
Analyse van *Trichilia quadrivalvis* D.C. Een belangrijke oliehoudende plant uit de hoogvlakte van Kwango. (**Analysis of *Trichilia quadrivalvis,* an oilseed plant from the plains of Kwango.**) [French summary ½ p.]
Bull. agric. Congo belge, 1958, **49**: 1301-5, bibl. 7.

The nuts contained 52% of oil and the residual cake 20·76% of protein. The oil was viscous and bright green in colour. The iodine index was low and the saponification index very high.

Tannin plants.

1651. Wattle Research Institute, Pietermaritzburg.
Report of the Wattle Research Institute for 1957-1958, 1958, pp. 40.

A review of work in progress includes the following: *Silviculture:* Thinning experiments harvested at 9 and 7 years showed maximum tannin yields for stand densities of 623 and 868 trees per acre respectively. Other investigations were concerned with spacing, regeneration of wattle in frosty areas, use of wattle in arable crop rotations. *Genetics and plant breeding:* Progeny testing, encouraging results of quarter-height sampling for tannin analysis tested against total bark results, vegetative propagation studies with air layering and simple budding and grafting. *Chemistry:* Fertilizer experiments, bark analysis, studies of extractives. *Entomology:* Pest control, mainly of bagworm by spraying and virus disease dissemination. The report also contains 3 papers, viz. Report on a tour of black wattle areas in Australia, by S. P. Sherry; Notes on wattle insects observed during the period 1957-1958, by L. L. J. Ossowski; and Spraying experiments with insecticides against wattle bagworm *Kotochalia junodi* (Heyl.) II., by L. L. J. Ossowski, in which endrin gave better results against older larvae than other insecticides.

Sundry plants.

(*See also* 1694.)

1652. Cool, B. M.
An investigation of the effect of some production techniques and weather factors on maple sap and sugar yields in a central Michigan woodlot.
Diss. Abstr., 1958, **19**: 8, being *L.C. Card No. Mic.* 58-2321 of 140 pp.

No significant differences in yield were found between taps at 2 or 3 feet, but one-foot tapholes were occasionally covered by snow and produced significantly lower sap and sugar yields. Different spout designs did not affect sap or sugar yields. Results from studies on tapping depth indicate that additional labour costs and tree damage resulting from tapping deeper than 2 inches are not compensated for by the increased yields obtained. Yields were not significantly affected by taphole diameter. Sap analysis was not affected by using metal buckets or plastic bags, but yields were higher when plastic bags were used. In one year out of four, taps on the northern side of the trunk produced significantly less sap than those on the other 3 sides, but the difference was not sufficient to justify avoiding the north side at the risk of concentrating taphole damage in the other quadrants. In trees of a given size yields were not increased significantly by increasing the number of tapholes. A close relationship was found between maximum daily temperature and sap flow.—Mich. St. Univ.

1653. Bączyk, S., Lempka, A., and Słowiński, W.
Badania polarograficzne nad witaminą C w rokitniku (*Hippophae rhamnoides*) i dzikiej róży (*Rosa canina*). (**Polarographic studies on vitamin C in sea-buckthorn (*Hippophae rhamnoides*) and dog rose (*Rosa canina*).**
Przemysł Spoż., 1958, No. 2, pp. 58-61, from *Polish tech. Abstr.*, 1958, No. 3, Abstr. 5,553.

In comparing the polarographic and potentiometric titration methods for vitamin C determination in the fruits of buckthorn and rose, it was found that the two fruits produced polarographic waves that differed in shape and height, although the conditions under which both sets of determinations were made were identical. This indicates the need to prepare separate standard curves for each new raw material to be analysed.

1654. Umans'ka, N. G.
A study of the phytoncidal properties of *Ledum palustre.* [Ukrainian, with Russian summary.]
Stud. nauk. Praci Kijivs'k. Un-t, 1956, **20**: 131-9, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,880.

Of 15 micro-organisms tested, 8, including the causal organism of diphtheria, were found to be affected by the volatile fractions and alcohol-water infusions of *Ledum palustre.* The phytoncides showed no toxicity to mammals.

Noted.

1655.

a Anon.
New Gila safflower.
Agric. Res. Wash., 1958, **7** (5): 15.
Gila is resistant to phytophthora root rot and rust and yields well.

b Aspinall, G. O., and Cañas-Rodriguez, A.
Sisal pectic acid.
J. chem. Soc. Lond., 1958, pp. 4020-7, bibl. 11.
Extraction from leaves and chemical composition.

c CHATTERJEE, A., AND OTHERS.
Some chemical, pharmacological and antibacterial properties of *Coleus aromaticus* Benth.
Sci. and Cult., 1958, **24**: 241-3, bibl. 1, illus.
Used in the treatment of cholera.

d CHAUDHARY, S. S., PAUL, V., AND HANDA, K. L.
A short note on some of the Indian *Solanum* species.
Curr. Sci., 1958, **27**: 409-10.
Alkaloids in 3 native spp.

e FULTON, C. C.
Some micro-crystal tests for colchicine.
J. Ass. Off. agric. Chem. Wash., 1958, **41**: 756-8, bibl. 6.

f GURVIČ, N. L.
The possibility of utilizing wild growing *Tournefortia* for obtaining perfumery flower extracts. [Russian.]
Krat. Otčet o nauč.-issled. Rab Vses. n.-i. In-ta maslič. i efiromaslič. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 103-5, from *Ref. Ž. (Biol.)*, 1958, No. 4, Abstr. 15,886.
By extracting essential oil from whole inflorescences of *T. sibirica.*

g IMASEKI, I., SHIBATA, S., AND YAMAZAKI, M.
Biogenesis of ephedrine.
Chem. Ind. Lond., 1958, No. 49, p. 1625, bibl. 10.
One of a series of biochemical tracer studies on *Ephedra distachya* grown hydroponically.

h KROLL, U.
The breeding of improved pyrethrum varieties.
Pyreth. Post, 1958, **4** (4): 16-19, illus.
A review of the methods used and the results of recent variety trials.

i LIONNET, J. F. G.
Seychelles vanilla.
World Crops, 1958, **10**: 441-4, bibl. 3, illus.; 1959, **11**: 15-17, bibl. 2, illus.
Growing conditions, propagation, management, curing and marketing.

j MEHTA, C. R., AND SHAH, N. B.
Chemical examination of *Evolvulus alsinoides* Linn.
Sci. and Cult., 1958, **24**: 180-1, bibl. 4.
Three alkaloids in this important Indian drug plant identified.

k MORRIS, M. P., ROARK, B. A., AND CANCEL, B.
Simple procedure for the routine assay of *Dioscorea* tubers.
J. agric. Food Chem., 1958, **6**: 856-8, bibl. 6.
Maceration, acid hydrolysis and diosgenin extraction.

l PEREIRA PINTO, G.
Contribuição ao estudo tecnológico e econômico da neutralização do oleo de babaçú. **(Contribution to the technological and economic study of neutralization of oil from *Orbignya speciosa.*)** [English summary ½ p., French ¾ p.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 209-73, bibl. 73, [received 1958].
Characteristics, composition and processing.

m PRENTICE, A.
Ginger in Jamaica.
World Crops, 1959, **11**: 25-6, illus.
A short popular account, including economic aspects.

n RAJAN, S. V.
The hairy caterpillar pest of cardamom.
Mysore agric. J., 1958, **33**: 71-5, bibl. 3.
Honge and fish oil rosin soaps, DDT and parathion all effective against *Eupterote canaraica.*

o TALAPATRA, S. K., AND CHAUDHURY, N. A.
Macralstonine, an alkaloid of the trunk bark of *Alstonia macrophylla* Wall.
Sci. and Cult., 1958, **24**: 243-5, bibl. 2.
Yield 0·06%; hypotensive character resembling that of rauwolscine.

p TAYLOR, D. A. H.
The isolation of solasodine from the berries of *Solanum macranthum.*
J. chem. Soc. Lond., 1958, p. 4216, bibl. 1.

q TROITZSCH, R.
Arznei- und Gewürzpflanzen auf der 6. Landwirtschaftsausstellung der DDR in Markkleeberg. **(Medicinal and spice plants at the 6th Agricultural Exhibition at Markkleeberg.)**
Dtsch. Gartenb., 1958, **5**: 284-5, illus.
Including notes on machines for harvesting peppermint leaves and stolons.

r TUCAKOV, J.
Contribution des pharmaciens à l'organisation de recherche et d'exploitation des plantes médicinales et aromatiques spontanées en Yougoslavie. **(The pharmacists' contribution to organizing the search for, and cultivation of, medicinal and essential-oil plants native to Yugoslavia.)** [German summary ¼ p.]
Qual. Plant. Maveg., 1958, **5**: 121-33.

s U.S. DEPARTMENT OF AGRICULTURE.
Black and white pepper: world production and trade.
Foreign Agric. Circ. U.S. Dep. Agric. **FTEA 2-58,** 1958, pp. 11.
1957 production 14% down on 1956; 1958 forecast at 163·5 m. lb., a fraction higher than 1957.

t VAGHANI, D., AND THAKOR, V. M.
Chemical investigation of *Coriandrum sativum*.
Curr. Sci., 1958, **27**: 388-9, bibl. 4.
Analytical data on fruits of this medicinal plant.

u VENEMA, K. C. W.
Some notes regarding the cultivation of citronella grass (*Andropogon nardus* subsp. *genuinus* Hack.) and lemon grass (*Andropogon nardus* var. *flexuosus* H.).
Potash and trop. Agric., 1958, **1**: 38-46, bibl. 10.
Culture in various countries.

v VENTURA, M. M., AND HOLLANDA LIMA, I.
Proteínas da amêndoa de babaçu (*Orbignia martiana* B. Rodr.). III. Estudo por eletroforese em papel. (**The proteins from babassu-kernels. III. Examination by paper electrophoresis.**) [English summary ¼ p.]
Phyton, 1958, **11**: 15-21, bibl. 3.

w VOINOV, G. V.
***Laser trilobum*, a valuable spice plant.** [Russian.]
Bot. Žurnal, 1958, **43**: 1340.
Essential oil of the seeds contains limonene and perillaldehyde.

FLORICULTURE.

General.

(*See also* 1077q, 1343-1347, 1774b, e, g, i, 1993, 1998, 2018b.)

1656. MINISTRY OF AGRICULTURE, LONDON.
Commercial production of pot plants.
Bull. Minist. Agric. Lond. **112**, 2nd edition 1958, pp. 68, illus., 5s. 6d.

The affairs of commercial growers of pot plants have undergone many changes since the first edition of this bulletin was published in 1939, the most striking of which (possibly because it is the most recent) is a remarkable increase in the sale of foliage plants. The bulletin has, therefore, been completely rewritten. In the general section more attention is paid to nursery planning and layout, and to organization in relation to propagation and cultural management. Following the general section are specialist sections on flowering pot plants, plants forced as pot plants, bulbs as pot plants, and ferns and other foliage plants in which details of propagation, cultural requirements and preparation for market are given for each of the main species.

1657. FOSLER, G. M.
An easy method for germinating flower seeds—plus seed-storage hints.
Circ. Ill. agric. Ext. Serv. **796**, 1958, pp. 11, illus.

Flower seeds have germinated successfully in a ½-in. layer of vermiculite spread over a soil mixture of 1 part garden loam, 1 part leaf mould or shredded peat moss and 2 parts sand. Other points dealt with include temperatures, days taken by various species to germinate, and the storing, testing and longevity of flower seeds.

1658. TOD, H.
Effect of gibberellic acid on seed germination.
Gdnrs' Chron., 1958, **144**: 257, 260.

Increased percentage germination of anemone, cotoneaster and primula seeds was obtained after they had been soaked for 20 hours in GA solutions. In no case was any stimulation of growth visible in the seedlings grown from the treated seeds. With some species a 25 p.p.m. GA solution resulted in better germination than a 50 p.p.m. solution.—Edinburgh School Agric. J.R.L.

1659. BRUMM, F.
Erfahrungen bei der Steckholzvermehrung. (**Results in the propagation of woody plants by cuttings.**)
Gartenwelt, 1958, **58**: 416-17.

Cuttings of 8 ornamental species were overwintered in bundles, laid horizontally in a flat-bottomed trench covered with frozen clods and some loose earth. The rooting percentage after this treatment averaged 68·7% during the period 1955 to 1957. Cuttings which had been overwintered by heeling-in with a straw covering had averaged only 49·7% rooting in 1952-1954.

1660. DORSMAN, C., AND RAVENSBERG, K.
Stekken en enten onder waternevel. (**Cuttings and grafts under mist spray.**)
Jaarb. Proefst. Boomkw. Boskoop 1957, pp. 20-31, bibl. 1, illus.

Mist production by spray nozzles (Florida 550A) in a greenhouse section with no plastic lining was compared with that produced by a humidifier in a plastic-lined section. With the nozzles soil temperature was about 2° C. lower than with humidification, and became too low for satisfactory rooting when outside temperatures became low; with the humidifier, soil and air temperatures tended to rise too high when the outside temperatures were high. Results with cuttings of 35 species showed that rooting percentages were in most cases similar under the 2 systems, but that where differences were marked, they generally favoured the nozzle system. Leaf injury and defoliation of *Chaenomeles simonii*, *Euonymus alata* and *Gypsophila* Flamingo were more severe under nozzle-formed mist than with humidification, but *Rhizoctonia* infection was more marked with humidification. In grafting the unions formed by rhododendrons, azaleas and *Chamaecyparis* were better under double glass than under either mist system. Comparison of costs between the 2 systems showed that the nozzle installation was the cheaper when suitable main water was available, but that where rainwater was used costs were similar.

1661. BRADLEY, K.
Methods, equipment for propagation under mist.
Amer. Nurserym., 1958, **107** (12): 12, 64-70.

The author gives the gist of a lecture by a nurseryman, H. M. Templeton, Jr., who describes his methods and equipment for mist propagation. Points of interest include: In the beds a well-drained, but heavy, red clay is used as a rooting medium, which is fumigated between batches of cuttings; the beds are covered with plastic supported on wire mesh frames; high-capacity nozzles are used in a half-inch spray line; a mobile canvas shelter is used to shade areas during planting up; a glass electronic leaf is used; rooted cuttings are hardened off by cutting progressively larger holes in the plastic; and the rooted cuttings are left in the rooting bed until they are ready for transplanting.

1662. BRICKELL, C.
The use of polythene covers for propagating cuttings and seeds.
J. roy. hort. Soc., 1958, **83**: 515-16, illus.

Polythene bags supported by a bamboo and wire frame to enclose pots were used successfully in propagating cuttings. Horticultural vermiculite was a satisfactory rooting medium, but a mixture of vermiculite and J.I. seed compost (1:1) was better when cuttings had to remain in the pots for some time. A wide range of plants was rooted at Wisley. Seedlings were also raised in a similar manner.

1663. LANGE, P.
Wuchsstoffmittel Taxoplant. **(The growth substance Taxoplant.)**
Gartenwelt, 1958, **58**: 376-7.

Taxoplant (based on NAA) dips did not affect the rooting of croton, chrysanthemum and bougainvillea cuttings. Sprays of 0·01% Taxoplant applied twice weekly to gloxinias for 5 weeks during February and March slightly improved growth but did not affect leaf or flower numbers. After 42 days of Taxoplant treatment cuttings of *Begonia rex* showed better growth than control plants. After 73 days treatment some plant injury was observed on a vigorous variety; with slower-growing varieties there was no injury, but leaf numbers were lower than in control plants.—Inst. ZierpflBau. Weihenstephan.

1664. ANSALONI, E.
Nuove tecniche d'innesto. **(New budding techniques.)**
Frutticoltura, 1958, **20**: 677-8, illus.

A square or rectangular piece of special sheet rubber is held round the stock and the inserted bud by a staple such as is used for fixing pages of magazines or small notebooks. The device was patented by a German nurseryman, and has been thoroughly tested in Italy, where the rubber, known as "Legomatic", has been used for roses. Modified forms are being tested for fruit trees.

1665. ANON.
Polythene film pots show interesting results at a Bucks nursery.
Comm. Gr, 1959, No. 3288, p. 67, illus.

Many nursery plants, including tomatoes, bulbs, cucumbers, freesias, geraniums, salvias and alpines, have made satisfactory growth in plastic pots. Ring culture of chrysanthemums, using polythene pots standing on polythene sheets, also gave good results. Watering was simplified, and the pots were easily sterilized. The use of polythene pots also facilitated the loading and transport of plants.

1666. (MAHLSTEDE, J. P.)
Test lightweight media for potting ornamentals.
Ia Fm Sci., 1958, **13**: 105-6, illus.

Tests showed that sphagnum-perlite and peat-perlite mixtures can be used successfully for the production of most deciduous ornamentals for sale in pots. Forsythia forced in a sphagnum-perlite mixture and fertilized every third watering produced more growth than with other media and fertilization rates. Packing methods are discussed briefly.

1667. ITAKURA, T., SHIRAKI, Y., AND SHIRAKI, S.
Effects of gibberellin on the growth and flowering of several flower crops. (The second report.) [Japanese, with English summary ⅔ p.]
J. hort. Ass. Japan, 1958, **27**: 186-92, bibl. 9, illus.

Solutions of GA were applied to pot plants, at rates of 25, 50 and 100 p.p.m. Flowering of treated cyclamen was about 20–25 days earlier than that of control plants. Vegetative growth was stimulated and flowering was accelerated in petunia after GA treatment. Flowering of freesia, narcissus and Dutch iris was accelerated by about 3–7 days, but Easter lily was not affected by GA. With both pansy and *Primula malacoides*, flowering was accelerated, and plant height and peduncle length were also increased. Growth of young calceolaria plants was stimulated by GA. Flowering of *Adonis amurensis* was hastened and vegetative growth was strikingly increased after treatment. Leaf expansion of cut hydrangea branches was hastened when they were dipped into a GA solution. The viability of pollen grains from cyclamen and *Primula malacoides* was not damaged by GA treatment. [For Part 1 see *H.A.*, 28: 2851.]

1668. POLIVKA, J. B.
DDT is still best weapon against Japanese beetle.
Ohio Fm Home Res., 1958, **43**: 56, illus.

In comparative tests with the new insecticides, Sevin, Guthion and Thiodan, DDT still gave the highest percentage kill of Japanese beetles on roses and other ornamentals.

1669. (RASKI, D. J.)
Nematode problem with ornamentals.
Flor. Exch., 1958, **131** (26): 12.

Recent work has shown that stunting, dieback and leaf chlorosis of roses is caused by *Pratylenchus vulnus*, that reduction in growth and vigour of azaleas is caused by *Tylenchorhynchus claytoni*, and that extreme bulb and root rot of cymbidium orchids results from attacks by *P. scribneri*. These nematodes may be controlled by soil fumigation with DD, Telone, EDB or dibromochloropropane.—Univ. Calif.

Annual and herbaceous plants.

(*See also* 1021, 1040, 1572, 1774j, l, m, o, p, r, u-x, 1775a-e, g, h, j, m, p.)

1670. HOLLEY, W. D., AND CAMPBELL, J. K.
Handling young carnation plants.
Bull. Colo. Flower Grs' Ass., 1958, No. 101, from abstr. in *Bull. N.Y. St. Flower Grs*, 1958, No. 156, p. 7.

Plants watered normally during the early stages of growth showed an increase in production of 3½% over those which were allowed to wilt, but there was no difference in later growth or in flower quality between the 2 lots of plants. Plants raised from frozen cuttings after gradual thawing and plants grown outside to the transplanting stage produced about 8% more flowers than plants raised in uncooled or air-cooled greenhouses. It is suggested, however, that, as the frozen cuttings were from a different lot of plants, the increased flower production may not have been a result of freezing. The frozen cuttings cropped about 1 week earlier than plants grown in an air-cooled house, and 2 weeks ahead of those grown in an uncooled house. Young plants grown in raised nursery beds gave satisfactory results in Colorado, with lower and earlier branching.

1671. GOLDSBERRY, K. L.
Peat pots vs. the nursery bed method for growing young carnation plants.
Bull. Colo. Flower Grs' Ass., 1958, No. 101, from abstr. in *Bull. N.Y. St. Flower Grs*, 1958, No. 156, p. 8.

No definite growth advantage was observed from using peat pots compared with nursery beds, but peat pots occupied less space and resulted in easier handling during transplanting and less root injury, and simplified selection for diseases and poor growth. Costs of peat pots and of filling them are, however, considerably higher than the costs of preparing nursery beds.

1672. BRIERLEY, P., AND SMITH, F. F.
Carnation viruses in the United States.
Phytopathology, 1957, **47**: 714-21, bibl. 32.
New views on carnation viruses in the United States.
Flor. Exch., 1958, **131** (12): 16, 48-9, bibl. 15, illus.

In both papers symptoms, transmission and detection by indicator plants are described for carnation streak, aster yellows, carnation mosaic, carnation mottle and carnation ringspot diseases. Some extra technical details are included in the first paper, whereas points of interest to growers are stressed in the second. Spring is the best time for indexing. *Dianthus barbatus* and *Gomphrena globosa* have proved satisfactory indicators for mottle, mosaic and ringspot.—Agric. Res. Serv., Beltsville, Md.

1673. BAUDEWIJN, J.
Analyse du travail et prix de revient dans la culture des chrysanthèmes en pots. (**Analysis of labour and costs in the growing of potted chrysanthemums.**)
Rev. Agric. Brux., 1958, **11**: 1065-78.

Studies in 1956 and 1957 showed that the labour needs amounted to about 30 minutes per pot at an hourly wage of 25 fr. Belg. Other costs amounted to 8–9 fr. of which 4 fr. were the cost of the pot. The economics of chrysanthemum production in the Limbourg area and its place in market gardening are discussed.

1674. SAMMAN, Y.
Low temperatures affect chrysanthemum flowering.
Bull. N.Y. St. Flower Grs, 1958, No. 152, pp. 2-3, illus.

Five low night temperatures (35–55° F.) given for 10–15 nights at the beginning of short-day treatment were compared with the normal 60° F. A gradual increase in stem length and in number of mature leaves occurred as temperatures were decreased. Multiple crowns were formed following 40° F. for 15 nights in 3 of the 4 varieties studied. The average number of flowers which developed did not appear to be affected by low temperatures. The delay in flower development was considerable with decreasing temperatures (the maximum delay occurring around 40° F.) and also with increasing duration of low temperature. There was evidence that flower initiation did not take place under a combination of short days and low temperatures. Flower initiation was faster at 60° F. than at the other experimental temperatures used. When low temperatures occurred before short-day treatment was started or during flower development, the delay in the flowering schedule was not critical.—Cornell Univ.

1675. JACKSON, C. R., AND WOLTZ, S. S.
Yellow strapleaf disease of chrysanthemum.
Plant Dis. Reptr, 1959, **43**: 98-101, illus.

Symptoms of yellow strapleaf in pompon chrysanthemums tended to be more pronounced during periods of high temperature. The disease was found on various soil types throughout Florida and was not related to soil treatment. Potted plants have not shown disease symptoms, and severely stunted plants recovered rapidly when they were transplanted from a bed, potted (in diseased soil) and placed in a greenhouse. The disease was not affected by nutrient supply, and there was no indication of herbicide injury. The disease was also not transmitted by grafting. Tip cuttings from affected plants developed normally after slow initial root growth.—Gulf Coast Exp. Stat., Bradenton.

1676. KEMP, W. G.
A new root rot of florists' chrysanthemums in Ontario.
Canad. J. Plant Sci., 1958, **38**: 464-76, bibl. 4, illus.

A disease found on *Chrysanthemum morifolium* var. White Shasta was characterized by severe root rot, general stunting and foliar chlorosis and necrosis. Symptoms were most severe on plants growing in infested soil at temperatures between 55° and 60° F. Inoculation tests suggest that the disease is restricted to the florists' chrysanthemum, but there was marked varietal susceptibility. There was no evidence that the pathogen was carried within cuttings taken from infected plants. Both steam sterilization and methyl bromide fumigation eliminated the pathogen from infested soils.—Canada Dep. Agric., St. Catharines, Ont.

1677. KRISTENSEN, H. R., AND THOMSEN, A.
Chrysanthemum-viroser. **(Virus diseases of chrysanthemum.)** [English summary $\frac{3}{4}$ p.]
Tidsskr. Planteavl, 1958, **62**: 627-69, bibl. 40, illus.

Of the 9 virus diseases of chrysanthemum described only one, aspermy, is of importance in Denmark and has been studied there. The best recovery of affected plants was obtained by exposing them to 37°–38° C. for at least 32 days during the period April–May. Small plants were more easily cured than large ones, but tip cuttings of the latter usually proved virus-free. Sanitary measures and the propagation of healthy plants are discussed.

1678. DIMOCK, A. W.
Ascochyta ray blight of chrysanthemums now established in New York.
Bull. N.Y. St. Flower Grs, 1958, No. 154, pp. 1, 4, illus.

The symptoms caused by the ascochyta ray blight fungus (*Mycosphaerella ligulicola*) are described. Recommended control measures include ploughing under diseased refuse in the autumn, soil sterilization with steam, chloropicrin or methyl bromide, and, if possible, field fallowing.

1679. JACOBS, W. P.
Further studies of the relation between auxin and abscission of coleus leaves.
Amer. J. Bot., 1958, **45**: 673-5, bibl. 12.

Leaf blades were removed from 2 series of coleus plants, (*a*) from 2 adjacent sides of the stem, and (*b*) spirally, one from each node. The ends of the 2 uppermost cut petioles were treated with lanolin. In a third series (*c*), treatment was as in (*a*), but the lanolin contained 1% of IAA. Abscission of the petioles from the 3rd and 4th nodes was completed a day earlier in series (*b*) and (*c*) than in series (*a*), showing that IAA had the same accelerating action as the presence of a leaf blade at the node vertically above. In another experiment, application of IAA in lanolin to all the leaf axils of coleus plants after removal of every axillary bud or shoot, accelerated the abscission of the 3 oldest leaves. [See also *H.A.*, 26: 49.]

1680. FAIRBANK, H.
Gerberas.
J. roy. hort. Soc., 1958, **83**: 503-9, bibl. 5.

Gerbera plants were successfully overwintered in an unheated glasshouse by withholding water from late September and covering the plants with straw. Some of the literature on gerbera problems is discussed, and the author briefly describes his recommendations for growing gerberas in unheated glasshouses and frames.

1681. BOWE, R.
Zur Züchtung und Kultur der *Gerbera jamesonii*. **(The selection and culture of *Gerbera jamesonii*.)**
Dtsch. Gartenb., 1958, **5**: 313-15, 318, bibl. 22, illus.

The author reviews work on breeding and cultural methods with gerberas. He considers that some of the uncertainties associated with gerberas may be removed by growing them in peat with pH regulation.—Inst. Gartenb., Dresden-Pillnitz.

1682. CHANGSRI, W., AND WEBER, G. F.
Leafspot of marigold, *Tagetes erecta*, caused by *Septoria tageticola* n. sp.
Phytopathology, 1958, **48**: 561-5, bibl. 4, illus.

This paper is concerned primarily with mycological aspects of this disease, which is characterized by oval to irregular, smoky-grey to black spots on the leaflets, speckled with minute pycnidia. In varietal susceptibility studies on 16 varieties of African and French marigold all the former (*T. erecta*) proved very susceptible and all the latter (*T. patula*) resistant or immune.—Univ. Fla, Gainesville.

1683. Ogawara, K., and Ono, K.
Studies on the germination of *Portulaca grandiflora* seeds. (I.) [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 193-200, bibl. 5.

After-ripening of *Portulaca* seeds was hastened by stratification. Moist seeds exposed to 30° C. before or during stratification did not continue after-ripening. Stratification under anaerobic conditions delayed after-ripening, while seeds stratified with saturation levels of oxygen or carbon dioxide remained almost dormant. In seeds stored for one year at room temperature the after-ripening period was decreased. When seeds were dried after stratification, germination capacity was significantly increased, and this was maintained for up to 5 weeks. This increased capacity was lost if seeds were remoistened. Dormant seeds did not germinate during a 5-month period, when they were kept on a moist substrate at 30° C. Seeds did germinate at 40° C., but the percentage germination was low. Germination was increased by soaking the seeds in a mixture of thiourea and potassium nitrate or by fumigating with cyanide gas. The time required for seed maturation was about 10 days.

1684. Thompson, H. S.
***Pythium* rot of *Saintpaulia,* the African violet.**
Canad. J. Bot., 1958, **36**: 843-63, bibl. 12, illus.

Many fungi and bacteria were isolated from African violets affected with root and crown rot, but, of these, *Pythium ultimum* Trow was the only organism that proved to be pathogenic to this host. *P. ultimum* readily infected leaf cuttings, rooted cuttings, and the petioles and leaves of plants when these were in contact with moist infested soil. Inoculum placed against the crown of a healthy plant also caused infection, but the lesion developed slowly and usually only a small amount of tissue was decayed. On the other hand, when the crowns and roots of healthy plants were set in infested soil they remained healthy; but they became predisposed to attack when they were subjected to prolonged exposure to light of very high intensity or when the roots were infested with nematodes (*Meloidogyne* sp.). Alternating periods of overwatering and drying did not increase the susceptibility of these healthy plants. When young plants, large enough to be planted singly in soil, were allowed to remain in vermiculite, a non-nutritive substrate, until they yellowed and were then planted in infested soil, they became infected and completely decayed. However, plants at least a year old that had been placed in vermiculite until they yellowed and were then planted in infested soil did not become infected. Infection and decay of leaf or rooted cuttings caused by *P. ultimum* occurred readily throughout the range of 10°–30° C. The disease also occurred over a wide range of soil moisture, but was favoured by the higher levels. When leaf cuttings and rooted cuttings of 30 varieties of African violets were planted in infested soil, all varieties proved susceptible. [Author's abstract.]—Bot. Plant Path. Lab., Ottawa, Ont.

1685. Kofranek, A. M.
Double snapdragons for shipping to eastern markets.
Calif. St. Flower Ass. Mag., August 1958, from abstr. in *Bull. N.Y. St. Flower Grs*, 1958, No. 156, pp. 7-8.

Snapdragons benched in a cloth house during October took 4½–5 months to mature, and had shorter spikes, fewer open flowers, longer stems and delayed flowering as compared with a crop benched in January, which matured in 3 months. The winter crop was also more susceptible to rust infection. Double snapdragons did not shed flowers in an ethylene-filled chamber. It is considered that in growing winter crops, supplemental heating to raise the night temperature to at least 50° F. may be necessary.

1686. Maatsch, R.
Blühende Antirrhinum von April bis Juli. Einige grundsätzliche Ausführungen zur Schnitt-Kultur. (**Flowering snapdragons from April to July. Some basic facts for growing them as cut flowers.**)
Gartenwelt, 1958, **58**: 359-61, illus.

The author emphasizes the dependence of snapdragons on light conditions for flowering. At Hanover the best results in forcing snapdragons followed December sowings, and the cultural methods used are described. Some American varieties that proved suitable for forcing are listed.

1687. Miller, R. O., Jr.
A study of the vegetative growth and flowering of snapdragons (*Antirrhinum majus*) as affected by the interrelationship of light intensity and night temperature.
Diss. Abstr., 1958, **19**: 13, being *L.C. Card No. Mic.* 58-2447 of 152 pp.

Studies on the response to night temperature have been abstracted previously [*H.A.*, 28: 2882]. Further work showed that adjusting night temperature upwards during the growing period after bright winter days resulted in earlier flowering but also in decreased plant size as compared with plants grown at normal temperatures. Reducing night temperatures after dull days throughout the growing period did not result in increased size or higher quality.–Cornell Univ.

1688. Ozawa, H., and Shimoda, Y.
Experiments on the application of fertilizers to greenhouse sweet peas. [Japanese, with English summary ½ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 63-8, bibl. 6.

During four years' experiments on the nutrition of glasshouse sweet peas it was found that too much N resulted in a decrease in the height of the plants and in the number of leaves present, and that P deficiency also seriously reduced growth. Excess N or K and P deficiency had an adverse effect on flower quality, causing a reduction in yield, with fewer flowers being produced on shorter stems. Bud drop increased when less fertilizer (particularly P) was applied. Leaf analysis showed that if excess of one element was applied, absorption of the others was reduced. J.R.L.

1689. Smith, N. G.
Stop that bud drop [in sweet peas].
Grower, 1958, **50**: 1176-8, bibl. 3, illus., 1218-20, illus., and 1959, **51**: 77, 79, illus.

Sweet pea experiments at Manchester University are described in 3 articles with the following titles: (1) *Sweet peas need calcium and good drainage.* In a poorly aerated solution culture of Spencer sweet peas root growth was slow and bud drop was high. With improved aeration root growth improved and bud drop became rare. There was also a high rate of bud drop when plants were grown with high N and low Ca levels at daily temperatures of 50–55° F. Applications of ¼ oz. chalk at planting time and again at the start of flowering are recommended. (2) *Protect sweet peas from heavy rain.* Bud drop with plants grown outside in cool weather was very high in plants receiving solutions of low osmotic pressure (0·5 atmos.). Ten days after transference of these plants to the higher temperatures of a glasshouse, bud drop ceased. Plants grown in the glasshouse with a 3-atmos. solution suffered most from nicotine fumigation. Outdoor plants may be protected from heavy rain by growing them on ridges, or by a plastic sheets placed so as to divert water away from the upper roots. (3) *Sweet peas need plenty of light.* Plants grown in muslin cages at 18% natural light intensity between early April and early May (temperature range 50–68° F.) dropped all but 2 of the flower buds formed. After several days of shading the peduncles stopped extension growth and very young flower buds turned yellow. The shading was removed for about 3 weeks in May and was then replaced from the end of May to mid-July. During this second period of shading plants that were shaded produced 272 opened flowers (at 18% light) and 405 opened flowers (at 30% light) compared with 576 flowers produced by plants kept in full light. The percentage of flower abortion was higher with January-sown plants than with October-sown plants.

1690. Applegate, H. G.
Photoperiod and temperature effects on gibberellin-sprayed plants.
Bot. Gaz., 1958, **120**: 39-43, bibl. 15.

Gibberellin (GA), when sprayed on *Zinnia elegans*, variety Scarlet Flame, was most effective in inducing internodal elongation at a temperature (15·5°C.) below that considered optimum (18·3° C.) for best commercial growth. A combination of low temperatures (10°, 12·8° C.) and high GA concentrations (100, 1,000, 10,000 p.p.m.) was more effective than one of high temperatures (18·3°, 21·1° C.) and high GA concentrations (100, 1,000, 10,000 p.p.m.) in inducing internodal elongation. A combination of intermediate temperature (15·5° C.) and low GA concentrations (0·0001, 0·001, 0·01 p.p.m.) was more effective than one of high temperatures (18·3°, 21·1° C.) and low GA concentrations (0·0001, 0·001, 0·01 p.p.m.). Quantitative but not qualitative differences in internodal elongation appeared between plants grown under 8-hour and 24-hour photoperiods. It would appear that length of photoperiod has only an indirect effect on GA induction of growth. [Author's summary.]—Univ. Conn., Storrs.

Bulbs, tubers, etc.

(*See also* 1509, 1774a, c, f, t, u, z, 1775f, i, q.)

1691. Slootweg, A. F. G.
Enkele ziekteproblemen bij bloembollen. **(Some problems regarding flower bulb diseases.)** [English summary ⅔ p.]
Tijdschr. PlZiekt., 1958, **64**: 445-51.

The author discusses the more important bulb diseases and their control. Root rot of hyacinth (*Fusarium culmorum*) has previously been controlled by formalin sterilization, but in heavily-infected soil chlorobromopropane has given better results, and Vapam plus formalin has also been effective. Infection of tulips by *Fusarium oxysporum* was encouraged by high temperature and high soil moisture at the end of the growing season; a pre-planting mercurial dip gave some control. In practice *Fusarium* infection of iris and narcissus has been found to increase after hot-water treatment, but it has not proved possible to confirm this in experimental tests. *Botrytis tulipae* has been controlled by carbamate sprays; control was further improved by storage in the autumn at 20–23° C., which retards spring growth, thus reducing the risk of damage by night frost. No practical recommendations for the control of *Botrytis narcissicola* and *B. galanthina* can yet be made. Hot-water treatment is very effective for control of *Ditylenchus dipsaci*, while *Pratylenchus robustus* and *P. penetrans* are effectively controlled by DD fumigation.—Lab. Bloembollenonderz., Lisse.

1692. van Slogteren, D. H. M.
Ratelvirus als oorzaak van ziekten in bloembolgewassen en de mogelijkheden de infectie door middel van grondontsmetting te bestrijden. (**Rattle virus as the cause of bulb diseases, and its possible control by soil sterilization.** [English summary 1½ pp.]
Tijdschr. PlZiekt., 1958, **64**: 452-62, bibl. 9, illus.

Symptoms of rattle virus are described in tulip, hyacinth, *Scilla campanulata*, *Ornithogalum thyrsoides*, *Allium moli*, *Eremurus* sp., narcissus and crocus. The level of infection in tulips varied according to planting depth, from 36·2% at 5 cm. to 95·1% at 22 cm. Artificial inoculation was not successful. Infection in plant beds was considerably reduced by soil treatment with formalin immediately before planting (at a rate of 2 l. formalin (40% formaldehyde) plus 20 l. water per 14 sq. m.). Injection with formalin 7 weeks before planting was ineffective, although chlorobromopropane injections were fairly effective. It is suggested that rattle virus is soil-borne, and it has been isolated from weeds growing in infected plots.—Lab. Bloembollenonderz., Lisse.

1693. Davidson, R. H.
Methyl bromide is bulb mite control.
Flor. Exch., 1958, **131** (13): 44-5, bibl. 2.

Tulip and hyacinth bulbs infested with *Rhizoglyphus echinopus* were fumigated for 2 hours with 3 lb. methyl bromide per 1,000 cu. ft., which gave 100% kill of mites, without affecting growth and flowering. Treatment at the same concentration to tulips, hyacinths and crocuses for 3 hours caused some injury.—Ohio St. Univ.

1694. Biswas, N. R. D., Raychaudhuri, S. P., and Dakshinamurti, C.
Soil conditions for the growth of saffron at Pampore (Kashmir).
Indian J. agric. Sci., 1957 (issued 1958), **27**: 413-17, bibl. 7.

The physical properties and chemical composition of 2 neighbouring soils, in only one of which will saffron flourish, are compared in order to assess the soil needs of the crop. The various differences are discussed, the major ones being high $CaCO_3$ and low available P_2O_5 in the unsuitable soil.—Indian agric. Res. Inst., New Delhi.

1695. Heydecker, W.
The germination of crocus seeds.
Gdnrs' Chron., 1958, **144**: 299.

Seed of named spring-flowering hybrid varieties, after collection in June, was sown on moist filter paper. Germination did not take place at a constant temperature of 65° F., nor when the temperature was allowed to fluctuate between 60° and 80° F., but 90% germination occurred at 45° F.—Univ. Nott. Sch. Agric., Sutton Bonington.

1696. Menzel, K.
Behandlung der Aussaaterde bei Cyclamen. (**Treatment of seed composts for cyclamen.**)
Gartenwelt, 1958, **58**: 384-5, illus.

Compost sterilization with formaldehyde or Larvacide, before sowing cyclamen seed, increased germination from 64% to 83% and 93% respectively.—Inst. Blumen- u. ZierpflBau, Berlin-Dahlem.

1697. Maatsch, R., and Isensee, H.
Schnittblumenertage bei Cyclamen IV. (**Cut-flower yields from cyclamen. IV.**)
Gartenwelt, 1958, **58**: 312-13.

Trials were continued with Lachshell and Lachs-Gefranst from two sources. Number of flowers produced per plant, duration of flowering and time of peak yield varied with both source and variety. [For Part III see *H.A.*, 27: 3754.]—Inst. Zierpflanzenb., Hannover.

1698. Wegner, I.-G.
Zusatzbelichtung bei Cyclamenjungpflanzen. (**Supplementary lighting for cyclamen seedlings.**)
Dtsch. Gartenb., 1958, **5**: 289-90, bibl. 1, illus.

The development of cyclamen seedlings was accelerated by the use of extra light during the night. Cyclamen seedlings sown on 10 October and given 8 or 11 hours of extra light made as much growth as non-illuminated seedlings sown on 10 September or 10 August respectively. By July the difference in size had practically disappeared, and there was no difference in flowering.—Inst. ZierpflBau, Humboldt-Univ., Berlin.

1699. Steffen, L.
Dahlien in Winterquartier. (**Winter storage of dahlias.**)
Gartenwelt, 1958, **58**: 398, illus.

Two methods of storing dahlias are described. After normal harvesting and drying the tubers are stored at 10° C. in boxes containing a dry sand/peat mixture or in plastic bags.

1700. van der Nes, A. G. A.
Het remmen van fresiaknollen. (**Retarding freesia corms.**)
A.R. Proefst. Groent. Fruit. Glas. Naaldwijk, 1957, pp. 78-9, illus.

Storage of freesia corms for long periods was most successful at 1–2° C., when the production of cormlets was at a minimum. After storage at this temperature the time of emergence was about 9 days earlier, and the average harvest date 15–18 days earlier, than after storage at higher temperatures. Corm production in the open following storage at temperatures below 5° C. was higher than from corms stored at higher temperatures.

1701. Apte, S. S.
Kieming van gladiolekralen I. (**Sprouting of gladiolus cormels. I.**) [English summary 18 lines.]
Meded. Dir. Tuinb., 1958, 21: 749-53, bibl. 11.

In general cormels which had formed on cormels showed a higher percentage of sprouting after 60 days than did cormels formed on corms. Larger cormels (about 27 per 10 g.) sprouted better than smaller sizes (77 or 166 cormels per 10 g.). Sprouting was promoted to some extent by soaking in water at 20° C. for 96 hours, or at 43°C. for 2½ hours, or by soaking in sulphuric acid (10% for 1 hour or 96% for 2½ min.). Scratching the cormels did not increase sprouting in groups of cormels that showed a low percentage of sprouting, but did improve it with cormels that showed moderate sprouting. Sprouting was not improved by gibberellic acid treatment, but shoot elongation was promoted.—Lab. Tuinbouwpl., Wageningen.

1702. Mega, K., and Tamura, J.
On the nutrient economy of gladiolus. III. Total nitrogen and phosphorus. [Japanese, with English summary 48 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 145-50, bibl. 10.

The total amount of N in the above ground parts of gladiolus reached its maximum in mid-growth, although the concentration of N decreased with growth. In the root little change in total N occurred, but the concentration again declined. In the parent corm the concentration increased six weeks after planting and then increased or decreased according as fertilizer had been given or not, while the total amount of N fell gradually with the growth of the plant. In the new corm both amount and concentration of N rose with growth. Total N in the whole plant was abundant, especially in the period of flower spike elongation and during growth of the new corm, but at flowering time a decrease became noticeable. As regards P the total amount in the whole plant decreased during the earlier stage of growth, and during the last stage of growth the content in non-fertilized plants was only half that in fertilized plants. The maximum amount of P in the top was found at flowering time, while in the corm the content gradually decreased. The concentration of P in both top and root showed a gradual fall during growth. Concentration in the parent corm was at first low, then increased and finally fell. No rapid increase was noticeable in the new corm. The fact that K occurred in greater abundance than N and P throughout the growing period suggests the desirability of applying greater amounts of K than of N and P.

1703. Runnels, H. A., and Wilson, J. D.
Soil treatment can reduce gladiolus dry rot.
Ohio Fm Home Res., 1958, **43**: 57, 62, illus.

Some degree of control of *Stromatinia* rot of gladiolus was obtained by corm treatment with calomel, yellow oxide of mercury and corrosive sublimate, but pre-planting soil treatments were more effective. After Mylone 85-W (200 lb. per acre), Vapam (50 gal. per acre) and Terraclor 75% active (133 lb. per acre) had been rotavated into the soil before planting, no differences in emergence and growth of gladiolus were observed. At harvest it was found that Terraclor had given considerable control of dry rot infection, both where healthy and diseased corms had been planted. Control with the other materials was less effective.

1704. Schenk, P. K.
De infectiecyclus van *Urocystis gladiolicola* op gladiolen. (**The cycle of infection of *Urocystis gladiolicola* on gladiolus.**) [English summary ½ p.]
Tijdschr. PlZiekt., 1958, **64**: 475-8, bibl. 8.

The life cycle of smut on gladiolus is described. Preliminary results of experiments with hot-water treatments and disinfection before planting showed promise.—Lab. Bloembollenonderz., Lisse.

1705. Kurki, L.
Ritarinkukan kukkimisen taustaa. (**Conditions for flowering in hippeastrum.**) [English summary 5 lines.]
Puutarha, 1958, **61**: 424, illus.

The flower buds are initiated from February to October. Bulbs rested under dry and warm conditions from September to mid-January will flower in February and March. For flowering at Christmas they should be kept dry during August, then given 4½ weeks at 15–17° C. and 4 weeks at 23° C.

1706. Bonifacio, A.
Su di una nuova malattia dell' amarillide. (**A new disease of hippeastrum.**)
Riv. Ortoflorofruttic. ital., 1958, **42**: 362-7, bibl. 11, illus.

All parts of the plant are subject to attacks by the fungus *Stagonospora curtisii.* The symptoms are described. Control measures consist in spraying the shoots with bordeaux mixture and a sticker as a preventive, and in removing diseased plants. The pathogen may remain latent in the bulb between growing seasons, thus the bulbs should be dug up for examination, and, if diseased, treated with 1% formalin at 40–50° C. Severely affected bulbs should be burnt·—Univ. Florence.

1707. SIMONET, M.
Hybrides interspécifiqes et intergénériques. **(Interspecific and intergeneric hybrids.)** [English, Russian and German summaries ¼ p. each.]
Ann. Amél. Plantes, 1957, **7**: 395-411, bibl. 18, illus.

The investigations discussed cover iris and wheat hybrids. Examples are given of relationships between chromosome number and flower size and pigmentation in interspecific hybrids and polyploid forms (triploid, tetraploid and pentaploid) of iris. Frost-susceptible and frost-resistant types are listed. The importance of amphidiploid hybrids is discussed.

1708. SCHREAD, J. C.
Control of iris borer with phosphate insecticides.
J. econ. Ent., 1958, **51**: 549-50, bibl. 8.

Several materials were sprayed onto both sides of iris plants at dilutions of 1: 400 and 1: 800 during May soon after the larvae of iris borer (*Macronoctua onusta*) had hatched, and again at dilutions of 1: 800 and 1: 1,600 during July when they were about half-grown. Phosdrin, at all dilutions, gave the best control both in May and July; Dibrom was effective against the young larvae in May, and Bayer 19639 was reasonably effective at the stronger dilution used in May.—Conn. agric. Exp. Stat., N. Haven.

1709. ROYAL HORTICULTURAL SOCIETY.
The lily year book, 1959, No. 22.
R.H.S., London, 1958, 9×5½ in., pp. 139, illus., 10s.+1s. 3d. postage, or U.S. $1.65 post free.

This volume is dedicated to a well-known grower of frittilaries, hence this genus receives more attention than in many previous years. Lilies grown at the Royal Botanic Gardens, Edinburgh, and at the Villa Taranto in Italy are described. W. B. Turrill has contributed 2 articles, on *Lilium* × *testaceum* (with a coloured plate), and on *Frittilaria persica* and other supposed species of *Frittilaria*. There is an article by E. B. Anderson and P. M. Synge on *Chionodoxa* and three symposia on feeding lilies, on pricking out lilies, and on frittilaries in the open. Lilies in pots and the vegetative propagation of lilies were discussed at Lily Group meetings. In the Lily Notes, which are more numerous than usual, many hints on the cultivation of lily species are included.

1710. SAGAWA, Y.
The production of polyploid Easter lilies. I. Triploids.
J. Hered., 1958, **49**: 194-8, bibl. 22, illus.

Four triploids were produced from reciprocal crosses between diploid and tetraploid clones of *Lilium longiflorum*; one of these has produced flowers which are larger and heavier-textured than its sister diploid seedlings. Data are presented which indicate that the diploid clones studied were cross-compatible, but they were self-incompatible, owing to pollen tube growth stopping after penetrating to one-tenth of the length of the style.—Univ. Conn.

1711. GARTNER, J. B., AND JACKSON, C. A.
Keep lily bulbs cool for more flowers at Easter.
Res. and Fmg N.C., 1958, **17** (2): 4, illus.

Lily bulbs for forcing, which were stored for 5 or more days at room temperature after delivery, produced fewer flowers and a wider variation in stem height than bulbs potted immediately after delivery. The flowering of bulbs stored at 31° F. after delivery for 3 weeks before potting was equal to that of bulbs potted on arrival.

1712. KOHL, H. C., Jr.
Shorter-stemmed Easter lilies.
Calif. Agric., 1958, **12** (12): 5, illus.

Forcing Easter lilies at different temperatures during 3 periods of 6 weeks each, with a low temperature (approximately 50° F.) in the middle period, resulted in stems averaging only 80% the height of those of plants forced continuously at 60° F. (night temperature). There were no significant differences in bud count, but flowering was delayed for 1–2 weeks. High (65°–68° F.) and medium (60° F.) temperatures in the first or the third 6-week period had relatively little effect on plant height.

1713. TSUKAMOTO, Y., AND SUZUKI, M.
Studies on fertilizers for florists' crops. II. Fertilizers for Easter lily. [Japanese, with English summary 30 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 151-6, bibl. 14.

An account is given of trials in 1953 and 1954 on the application of different combinations of N, P and K to Easter lily (*L. longiflorum*) bulbs grown in wooden boxes and their effects on growth of different parts of the plant. The plants were found to contain more K than N and more N than P. The influence of N on bulb production was particularly noticeable, while that of K was confined to bulblet production. The effect of P was less marked. [See also *H.A.*, 27: 1734.]

1714. DIMOCK, A. W.
Pointers on Croft root rot.
Bull. N.Y. St. Flower Grs, 1958, No. 155, pp. 1, 3.

In co-ordinated trials on Croft lilies in the United States, soil sterilization by steam improved plant height, range of rooting and root health in 5 out of 8 localities. Soil treatments, in general, did not appreciably reduce root rot [*Cylindrocarpon radicicola*], except in one plot where Omadine was successful. The author considers that cultural conditions are of particular importance in root rot control, and preventive measures are suggested.

1715. ANON.
Methods of avoiding root rot in lilies.
Bull. Ohio Flor. Ass., reprinted in *Flor. Exch.*, 1958, **131** (26): 41.

An application of 20% Terraclor dust to the basal portion of the lily bulb is effective for *Rhizoctonia* control. Care in watering is an important factor in reducing loss by root rot, and the potting mixture may be lightened by adding peat or rotted manure. Soil drenches with fungicides may also be helpful in combatting root rot.

1716. (BAILEY, E.)
Love life of a plant—*Spathiphyllum.*
Bett. Crops, 1958, **42** (7): 24-5, illus.

It is recorded that the flowering heads (spadices) of the shade-loving house plant *S. floribundum* may move as much as 6 inches towards one another to effect pollination by contact. [However, as the densely crowded flowers on the spadix are normally hermaphrodite, the object of the manoeuvre seems rather uncertain.—ED.]

1717. ROYAL HORTICULTURAL SOCIETY.
The daffodil and tulip year book, 1959, No. 24.
R.H.S., London, 1958, 9×5½ in., pp. 179, illus., 10s.+1s. 3d. postage, or U.S. $1.65 post free.

Among the varied articles in this issue is one on weed control in narcissi and tulips by P. Bracey, another describing the daffodils at Windsor by T. H. Findlay, and two on miniature daffodils by A. Gray and D. Blanchard. Tulip articles include an account of the tulips at the Keukenhof, notes on the early collectors employed by Messrs. van Tubergen, and hints on forcing tulips. Various shows are reported, from New Zealand and America as well as England.

1718. GILL, D. L., STUART, N. W., AND BEIJER, J. J.
Better tulip flowers in the south.
Flor. Exch., 1958, **131** (14): 14-15, bibl. 3, illus.

Standard and hybrid tulip varieties, precooled at 40° F. for 8 weeks at Beltsville (Md) or at Puyallup (Wash.), or for 6 weeks in the Netherlands, gave rise to plants, which, at Tifton (Ga), flowered 10–27 days earlier and produced longer stems and slightly smaller bulbs that did uncooled bulbs. Flowers from uncooled bulbs opened over a longer period and flowered more unevenly. Shading resulted in longer stems and delayed flowering by 1–2 days. At Atlanta (Ga) precooled bulbs also formed longer stems and flowered 2–7 days earlier than uncooled bulbs. [For earlier work see *H.A.*, 28: 1733.]

1719. STEFFEN, L.
Tulpen im Keller—Vorteile und Gefahren. **(Tulips in the cellar—advantages and dangers.)**
Gartenwelt, 1958, **58**: 371-2, illus.

Cellars used for the first stage of forcing tulips should contain only bulbs, be well ventilated and have a temperature below 9° C., so that growth is even. The bulbs are planted on a soil layer filling about two-thirds of each box and are covered preferably by sand, and the boxes are then stacked in the cellars. Care should be taken that the soil does not dry out during rooting.

1720. WILL, H.
Neue Erkenntnisse bei der Blumenzwiebeltreiberei. **(New discoveries in bulb forcing.)**
Gartenwelt, 1958, **58**: 412-13, illus.

Bulbs forced under greenhouse benches showed no difference in development or time of flowering whether they received artificial light by night or by day. With potted tulips incandescent lamps alone were not satisfactory, as leaf and flower colour were poor and the flower stalks were too long. Mercury-vapour lamps alone or with incandescent lamps gave good results.

1721. TOYODA, T., AND NISHII, K.
Studies on the high temperature treatment of tulip bulbs to prevent flowering. III. Effect of high temperature on the growth of buds in different positions in the bulb. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1958, **27**: 207-12, bibl. 12, illus.

After a pre-planting treatment at 35° C. bulbs which developed flower stalks and buds but did not flower produced new bulbs which were 23–30% heavier than those formed by untreated bulbs. Bulbs which produced flower stalks but not buds produced 20–26% more new bulbs than control bulbs. Treated bulbs which did not develop flower stalks showed poor production of new bulbs. [For Part II, see *H.A.*, 28: 3950.]

1722. TOYODA, T., AND NISHII, K.
Studies on the high temperature treatment of tulip bulbs to prevent flowering. IV. The effect of treatment in relation to variety, size and dormancy of the bulbs. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1958, **27**: 213-20, bibl. 23, illus.

Bulbs of 12 varieties were kept at 35° C. for 13 or 16 days from the end of September. Varieties with a short dormant period were sensitive to heat treatment, and 13 days proved sufficient to induce a high yield of new bulbs. When bulbs of 9, 11 and 13 cm. in diameter were kept at 35° C. for 10, 13, or 16 days, the smaller bulbs were more sensitive to heat treatment than the bigger bulbs. Three types of storage (in a room, in a cellar and suspended in a well) before heat treatment (13 days at 35° C.) were also compared, and the bulbs most sensitive to heat treatment were those which had been suspended in the well. It is suggested that in these bulbs dormancy was broken by the low temperature in the well.

1723. Kamerbeek, G. A.
Het blauw groeien van tulpebollen. (**Blueing of tulip bulbs.**) [English summary ½ p.]
Tijdschr. PlZiekt., 1958, **64**: 463-9, illus.

With some tulip varieties brown necrotic spots appear in the inner bulb scales during the development of the new bulb. Viewed through the outer healthy scale, which later becomes the bulb skin, the spots appear bluish. Experimental results have indicated that the disease is physiological, but applications of B, Co, Cu, Mg, Mn, Mo and Zn salts have produced no response. Increase in weight was apparently correlated with the disease, and factors which reduced growth also reduced infection.—Lab. Bloembollenonderz., Lisse.

1724. Green, D. E., and Brooks, A. V.
A note on the effect of P.C.N.B. in controlling tulip fire disease in the soil.
J. roy. hort. Soc., 1958, **83**: 517-18.

Soil treatment with PCNB (2 oz. per sq. yd) immediately before planting reduced the number of tulips infected with fire from 161 in control plots to 37 plants. The foliage of plants in treated soil was greener and healthier than that of plants in control plots.—R.H.S. Gdns, Wisley.

1725. Vlag, A. F., and Hulkenberg, A. M.
Proeven ter bestrijding van vuur in tulpen. (**Experiments on the control of tulip fire.**) [English summary 9 lines.]
Tijdschr. PlZiekt., 1958, **64**: 440-4.

Sprays of ferbam, zineb or thiram applied to tulips have controlled tulip fire (*Botrytis tulipae*), and increased bulb yields by at least 7,000 kg./ha. Five applications are recommended, 2 before and 3 after flowering, according to the weather. In preliminary experiments a concentration of 0·4% was most effective, but with low volume sprays concentrations of about 3% were more satisfactory. In experiments on old and new bulb soils spray treatments with ferbam and bulb dips of organic mercury were tested, and with all treatments yields were more than doubled. Results were better in the fresh soil than in the old. Forcing quality was not affected by the treatments.—Proefst. Bloembollencult., Lisse.

Lawns and sports turf.

(*See also* 1358-1361.)

1726. Davis, R. R.
The effect of other species and mowing height on persistence of lawn grasses.
Agron. J., 1958, **50**: 671-3, bibl. 12.

Common Kentucky bluegrass, Merion bluegrass, Park bluegrass, creeping red fescue, Chewing's fescue, Pennlawn fescue, Astoria bentgrass and some mixtures of these species were mowed ¾ inch and 2 inches high for five years. A botanical analysis of the sod was made in September of the fourth and fifth years. The percentages of the sods made up of planted grasses, weeds, and bluegrass are reported. Astoria bentgrass [*Agrostis tenuis*] completely dominated mixtures in which it was seeded. Bentgrass also spread into plots in which it was not seeded. Merion bluegrass and the red fescues were more resistant to invasion by bent than was common Kentucky bluegrass. The grasses or mixtures were invaded more by bent when mowed ¾ inch than when mowed 2 inches high. Plots seeded to bentgrass and mixtures and to Merion bluegrass and mixtures contained less weeds than the red fescues and Park bluegrass. Merion bluegrass alone and with red fescue survived better than other bluegrasses alone or in mixtures. Pennlawn fescue survived better than common creeping red fescue. The survival of the bluegrasses and fescues was favoured by high mowing. [Author's summary.]—Ohio agric. Exp. Stat., Wooster.

Orchids.

(*See also* 1774c.)

1727. Hunter, J. A.
New Zealand *Todea* fibre and orchid growing.
N.Z. Plants and Gdns, 1958, **2**: 342-5, illus.

The demand of orchid growers for fibre of the tree fern *Leptopteris* (formerly *Todea*) *superba* is denuding the natural vegetation of parts of New Zealand. The author shows, with illustrations, that excellent growth of cattleyas can be obtained in bark and of cyprepediums and cymbidiums in a bark, peat and sand mixture, without using any *Todea* fibre.

Succulents.

1728. Boom, B. K.
Notities over succulenten. (**Notes on succulent plants.**) [English summaries.]
Meded. Inst. Vered. Tuinbouwgew. **132,** 1958, pp. 32, illus.

This publication contains a series of reprints from the journal *Succulenta* between March 1957 and July 1958 on the taxonomy of the following succulent plants: *Crassula andegavensis*, *C. picturata* and hybrids, *C. graeseri*, *C. heterotricha*, *Echeveria pulvinata* Rose cv. Ruby, *Kleinia kleiniaformis*, *Cotyledon ladysmithensis*, *Sedum rubrotinctum* cv. Aurora, and *Altamiranoa grandyi*. There is also an article on "Naming cultivated varieties of succulents" and one on "The Institute of Horticultural Plant Breeding and its succulents".

1729. Parkinson, A. H.
Kalanchoes are easy to grow.
Grower, 1959, **51**: 268-71, illus.

The variety Tom Thumb has given the most satisfactory results, and cultural methods are described which produce plants for marketing during September to December. The short-day treatment given was 24 days of 8½ hours. Plants grown for marketing in September and October grew satisfactorily in 3½-in. pots, but for November and December marketing better plants were produced in 4- or 4½-in. pots.—Lancs. County Inst. Agric., Hutton.

1730. Rünger, W.
Über den Einfluss der Temperatur und der Lichtintensität auf die photoperiodische Reaktion und die Blütenentwicklung von *Kalanchoe blossfeldiana* Poellnitz cv. Tom Thumb. II. Einflüsse der Temperatur und der Belichtung vor der Kurztagsperiode. III. Einfluss von Tages- und Nachttemperatur und Wechselbeziehungen zwischen Temperatur und Lichtintensität während der Kurztagsperiode. (**The effect of temperature and light intensity on the photoperiodic reaction and flower development of *Kalanchoe blossfeldiana* var. Tom Thumb. II. The effects of temperature and light before the short-day period. III. The effect of day and night temperature and the interaction between temperature and light intensity during the short-day period.**)
Gartenbauwiss., 1958, **23**: 282-93, bibl. 8, illus., and 294-307, bibl. 7.

Part II [for Part I see *H.A.*, 27: 714]: During a period of long photoperiods preceding an inductive short-day period kalanchoe plants were exposed to different temperatures, and it was found that the flowering inhibition caused by long days was reduced by temperatures of 10–15° C. and increased by temperatures of 25° C. and above. In further experiments the light intensity was varied between 400 and 4,000 Lux during the long-day period, fluorescent lamps serving as sources of light. Flowering was not affected, and it is concluded that only low light intensity is needed to inhibit flowering during long days. Prolonged darkness, however, stimulated flowering, and the effect was much the same whether light was excluded for 1 day or 10 days. During prolonged darkness different temperatures acting for 5 days did not modify the flowering impulse in the subsequent short-day period, which indicates that the effect of temperature mentioned above occurs only during long photoperiods. The difference in the response to darkness and long photoperiods increases at higher temperatures but decreases at lower temperatures.

Part III: A diurnal rhythm of 15° and 20° C., applied during the short-day period, stimulated flower formation to a greater extent than did the most favourable constant temperature of 20° C. Other observations suggest that flower formation is composed of two separate processes which have their optima at about 15° and 20° C. respectively. Although the actual minima and maxima for these processes may be in the region of 10° and 30° C., flower formation at a constant temperature is possible only within the range at which the two temperature curves overlap, namely between 15° and 25° C. Further results show that where a diurnal rhythm occurs the processes of flower formation, in so far as they are controlled by temperature, are largely independent of light and darkness, but that they are benefited to some extent if the period of light is associated with the higher, and the period of darkness with the lower, temperature.—Inst. ZierpflBau, tech. Hochsch., Hannover.

1731. Petillon, E.
Neue Möglichkeiten mit *Rochea coccinea.* (**New possibilities with *Rochea coccinea.***)
Gartenwelt, 1958, **58**: 335-6, illus.

Instead of overwintering plants pinched in the autumn to produce bushy plants for flowering in May or June, the author suggests the following method of culture. Shoot tips taken in August are spaced 3×4 cm. or 4×5 cm. in boxes and overwintered. Cuttings are taken from these in February, and rooted in 8- or 9-cm. pots (at 4 or 5 per pot). By giving some heat the plants may be brought into flower by the end of April or early in May.

Roses.

(*See also* 1664, 1774h, 1775n.)

1732. de Boer, S.
Het voorkomen van het vroegtijdig uitlopen van rozen en lonicera. (**The prevention of early sprouting in roses and lonicera.**)
Jaarb. Proefst. Boomkw. Boskoop 1957, pp. 78-9, illus.

Rose bushes sprayed in early February with IPC did not start sprouting until the end of March. Untreated plants and those sprayed in December started to sprout in February. Sprouting of *Lonicera tatarica* was also delayed by an IPC spray, but the same treatment had no effect on *Ribes alpinum* and lilac.

1733. Harvey, J. M., Uota, M., and Lateer, R. W.
Rose bush storage life aided by decay control, new packing.
Flor. Exch., 1958, **131** (19): 17, 38.
Harvey, J. M.
A better storage life for California bare-root rose bushes.
Agric. Mktg, 1958, **3** (9): 10, illus.

A fibreboard carton with a liner of kraft paper coated with polythene provided the best conditions for storing rose bushes, which could be held for 5 months or more without loss. Packaging and transport costs were also reduced. Fungicidal decay was, however, favoured by conditions in the box, but its incidence was reduced from 13·1% to 0·5% by dipping the bushes in a captan solution (2 lb. of 50 w.p. in 100 gal. water) before packing.

1734. (Mahlstede, J. P.)
Potting roses for sale presents culture problems.
Ia Fm Sci., 1958, **13**: 87-8, illus.

With heavy grade roses pruning the roots to 6 in., instead of 12 in., resulted in as many buds breaking but in less growth in the first season, though in better growth in the second year. For light grade roses 8-in. root pruning was the best. In watering studies on roses growing in containers the best results were obtained from longer soaking and shorter drying periods.

1735. Kamp, J. R., and Pokorny, F. A.
The nutrition of greenhouse roses in high boron soils.
Ill. St. Flor. Ass. Bull., 1958, No. 184, from abstr. in *Bull. N.Y. St. Flower Grs*, 1958, No. 156, p. 7.

In beds containing between 5 and 7 p.p.m. of B flower production of Better Times roses increased with each increase in N and P levels, the effect being greater with N than with P fertilization. The effect of K fertilization was not consistent, but at the highest K levels flower production was reduced. None of the combinations of N, P and K had any significant effect on stem length. Soil applications of N tended to increase length of flower buds, but not significantly. Interactions between N, P and K affecting bud length and stem diameter were too small to be of commercial importance.

1736. Siegelman, H. W., Chow, C. T., and Biale, J. B.
Respiration of developing rose petals.
Plant Physiol., 1958, **33**: 403-9, bibl. 18, illus.

There was a respiratory rise before flowers opened, a peak when they were fully open and then a respiratory drop. The effects of DNP and other substances as inhibitors and stimulants of respiration are discussed.—Univ. Calif., Los Angeles.

1737. (Smeal, P. L.)
Severe rose pruning advised; various methods are explained.
Flor. Exch., 1958, **131** (24): 17.

Different methods and times of pruning glasshouse roses were compared. There was no significant difference in flower yield between hard cutback and gradual cutback treatments. Plants pruned in October gave the largest yearly production. Pruning in March gave the highest winter production. Yearly and winter production was lowest after April pruning. In a trial in progress comparing soft-pinch with hard-pinch treatments, the results obtained so far suggest that plants kept soft-pinched may produce more flowers. During February to April cutting with a down cut (cutting the stem at the first 5-leaflet leaf below the knuckle) produced more flowers than cutting with a normal cut (cutting above the second 5-leaflet leaf above the knuckle), but during the remaining months more flowers were produced by normal cutting.—Univ. Maryland.

1738. Koek, P. C.
Bacterial disease of roses. [In Dutch.]
Vakbl. Bloemist., 1957, **12**: 151, from abstr. in *Informationsdienst Weihenstephan*, 1958, No. 2, pp. 35-6.

Control measures for bacterial gall formation are to use healthy stock and to burn infected plants. When infection is widespread, soil sterilization with 4% formalin is necessary. Excess N fertilization favours the spread of the disease. The disease seldom occurs in soils with low pH values.

1739. Henneberry, T. J., and Travis, R. V.
New fungicides for the control of blackspot on roses.
Plant Dis. Reptr, 1958, **42**: 1297-8, bibl. 3.

Repeated spray applications of Phaltan (*n*-trichloromethylthiophthalimide) and Cyprex (*n*-dodecylguanidine acetate) mixed with Aramite or malathion reduced blackspot (*Diplocarpon rosae*) infestation by more than 65%. The fungicides were compatible with the acaricides and caused no spray injury, although they left conspicuous white deposits on the foliage.—U.S.D.A., Beltsville, Md.

1740. California Extension Service.
Rust fungus control on greenhouse roses.
Flor. Exch., 1958, **131** (25): 41.

Parzate or Dithane Z-78 at $1\frac{1}{2}$ lb. per 100 gal. plus a spreader-sticker applied at intervals of 7–10 days is recommended for controlling rust [*Phragmidium mucronatum*]. Manzate at 1 lb. per 100 gal. plus 6 oz. Tween 20 has given satisfactory results on Mayday and Happiness roses.

1741. Teitel, A., Zitti, R., and Bojor, O.
Speciile de măcieș din R.P.R. bogate în acid ascorbic. (**Rose species in Roumania with a high ascorbic acid content.**) [Russian and French summaries.]
Comun. Acad. RPR, 1956, **6**: 941-7, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 11,115.

The ascorbic acid content was highest in the hips of *Rosa pendulina* at 9,510 mg./100 g., followed by *R. glauca* at 5,280 mg./100 g. Species of the section *Canina* contained considerably less, namely 500–2,800 mg./100 g.

Other trees and shrubs.

(*See also* 1040, 1732, 1774k, n, q, s, y, 1775k, l, o, r, s, 1971.)

1742. Reisch, K. W., Chadwick, L. C., and Barker, P. A.
Dwarfing stocks for woody ornamental plants.
Ohio Fm Home Res., 1958, **43**: 60-1.

Successful grafts, using dwarfing stocks or interstocks, were obtained with *Malus atrosanguinea* on *Cotoneaster divaricata* or *Malus sargentii*, with *Crataegus phaenopyrum* on *Cotoneaster divaricata*, and with *Forsythia intermedia spectabilis* on *Forsythia* Arnold Dwarf. These combinations are under observation, but already *Malus atrosanguinea* on *Cotoneaster divaricata* shows promise as a dwarf tree. Several graft combinations that proved unsuccessful are also mentioned.

1743. de Boer, S.
Proeven met winterstekken. (**Experiments with winter cuttings.)**
Jaarb. Proefst. Boomkw. Boskoop, 1957, p. 19.

Cuttings of *Philadelphus* Virginal were taken at the end of February and treated with a solution of IAA (50 mg./l.) before being stored. When planted outside in April, 87% rooting had occurred by November. Using the same technique, cuttings of *Weigela* [*Diervilla*] Eva Rathke rooted best after treatment with 50 mg. IAA or 50 mg. IBA per litre.

1744. Neiswander, R. B.
Scale causing considerable damage to Ohio ornamentals.
Ohio Fm Home Res., 1958, **43**: 54-5, illus.
Scale is damaging Ohio ornamentals.
Flor. Exch., 1958, **131** (14): 27, 34.

Sprays of 1 pint 50% malathion emulsion in 50 gal. water control magnolia scale [*Neolecanium cornuparvum*] and euonymus scale [*Unaspis euonymi*]. For magnolia scale malathion should be applied in late September or October, or on a warm day in April. Three applications at 10-day intervals from mid-June are recommended for euonymus scale control.

1745. Bond, A. B.
Air-layer, and feed leaves.
A.H.S. Gdnrs' Forum, 1958, **1** (5): 1, illus.

An air-layer of camellia over 2 ft long, which had callused and just started rooting, was cut from the parent plant just before the first frost occurred, and was potted up and placed in a greenhouse. After twice-weekly applications of a foliar fertilizer until March, rooting was adequate to support the young plant.

1746. Weiser, C. J.
Effect of boron on the rooting of clematis cuttings.
Nature, 1959, **183**: 559-60, bibl. 3.

In two experiments boron, 50 p.p.m. supplied as boric acid, added to indole butyric acid, 50 p.p.m., accelerated rooting and increased the percentage of cuttings which rooted. In one experiment only the boron alone increased rooting. It is also reported that the rooting of cuttings of rhododendron and holly was enhanced by boron.—Ore. St. Coll., Corvallis.

1747. Wang, T. T.
Propagation of cryptomeria by cuttings in relation to parts of the crown from which the cuttings are collected. [Chinese summary 2 pp.]
Mem. Coll. Agric. nat. Taiwan Univ., 1957, **5** (1): 1-14, bibl. 3, illus.

Tip cuttings, about 40 cm. long and with a heel, were taken from the upper, middle and lower parts of 8-year-old trees of *Cryptomeria japonica*, and were planted in soil to a depth of 20 cm. The part of the crown from which the cuttings were taken affected the rooting percentage, callus formation, survival and subsequent root and shoot development. Cuttings from the middle part of the crown gave the best results and those from the upper parts the worst.

1748. Sharan, N.
Damping-off of gul mohur (*Delonix regia* Raf.) in India.
Plant Dis. Reptr, 1958, **42**: 1408, bibl. 1.

Isolations from infected seedlings of *Delonix* [formerly *Poinciana*] *regia* have shown the causal organism to be *Pythium debaryanum*. In preliminary control tests the best results were obtained by soil treatment with 3% Formalin, while Ceresan M (1: 50) was the most effective of the fungicides used for seed treatment.—Govt agric. Coll., Kanpur, U.P.

1749. Bukovac, M. J., and Davidson, H.
Gibberellin effects on photoperiod-controlled growth of *Weigela*.
Nature, 1959, **183**: 59-60, bibl. 3.

With photoperiods shorter than 14 hours vegetative growth of *Weigela* [*Diervilla*] normally ceases and dormancy ensues. A single foliar spray (50 p.p.m.) of gibberellin on plants grown at an 18-hr photoperiod and transferred to a 9-hr regime resulted in continued shoot elongation. In plants retained at an 18-hr photoperiod growth was accelerated. In the latter plants shoot extension was primarily due to increased length of internodes, whereas in the former, in which photo-induced dormancy was broken, both length and number of nodes were increased.—Mich. St. Univ., E. Lansing.

1750. Collins, R. P., and Waxman, S.
Dogwood graft failures.
Amer. Nurserym., 1958, **108** (8): 12, bibl. 11, illus.

A recent increase in failures with *Cornus florida* *rubra* grafted on common *C. florida* is attributed to the presence of *Chalaropsis thielavioides*. Control measures are being investigated. In the meantime sanitation during the grafting process and the use of vigorous, healthy stocks are recommended.—Univ. Conn., Storrs.

1751. BUZINOVA, A. I.
The productivity of *Euonymus europaea* in relation to the absolute weight of seeds. [Russian.]
Sb. Rabot po lesn. h.-vu Vses. n.-i. In-t Lesov. i meh. lesn. H-va, 1956, No. 32, pp. 157-60, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 10,900.

The weight of 1,000 seeds of large-fruited forms of *Euonymus europaea* was more than twice that of 1,000 seeds of small-fruited forms, i.e. 112–113 and 44–51 g./1,000 seeds respectively. Seedlings from large-fruited forms were more vigorous and yielded 1½–2½ times more root bark than those from small-fruited forms. It is concluded that the present minimum standard of 43·7 g./1,000 seeds should be revised upwards to 100 g.

1752. PILET, P.-E., AND MICHEL, H.
Rhizogenèse auxinique du *Ficus elastica*. **(Auxin-stimulated root formation in *Ficus elastica*.)**
Rev. hort. suisse, 1959, **32**: 50-1, bibl. 1, illus.

An overgrown *Ficus elastica* pot plant was successfully air-layered at the end of March using β-indoleacetic acid in lanolin. The method used is described and illustrated.—Univ. Lausanne.

1753. TIPPINS, H. H.
Control of citrus whitefly on gardenia.
J. econ. Ent., 1958, **51**: 552-3, bibl. 6.

Systemic and some non-systemic insecticides were applied in September and November against citrus whitefly (*Dialeurodes citri*) on *Gardenia jasminoides* grown in pots in a lathhouse. In the September tests demeton, Thimet and Bayer 19639 gave significantly better control than was obtained by natural means on the check plants. In November all the treatments, i.e. oil emulsion, malathion, demeton and Thiodan gave highly significant control. With the exception of oil emulsion, all treatments reduced cold damage in the same order that they controlled the insects. Oil emulsions are known to accentuate cold injury to plants.—Ga Exp. Stat., Experiment.

1754. TACHIBANA, Y., SAKAZAKI, N., AND IHARA, Y.
Studies in hibiscus. 1. Methods of promoting seed germination. [Japanese, with English summary 36 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 140-4, bibl. 14.

Of chemicals tested for their help in promoting germination in *Hibiscus* species 98% H_2SO_4 was the best, being very effective on seed of perennial species, though injurious to those of annuals. The treatment necessary to insure 80–90% germination in 10 days varied with species from 5 minutes to 2 hours. Lower concentrations were less effective. [See also *H.A.*, 27: 3798.]

1755. DANA, R. H., AND SHAW, D. H.
Meadow mouse control in holly.
Bull. Calif. Dep. Agric., 1958, **47**: 224-6, illus.

Steam-crushed whole oats treated with zinc phosphide (1 lb. per 100 lb. bait) was the most successful of the carriers tested for *Microtus* control. Endrin (2 lb. per acre) sprays applied in June controlled mice for about 58 days, and October applications controlled them for 71 days. At 8 lb. per acre toxaphene sprays gave about 80% control. A rodent repellent (5% Cefro polyvinyl acetate emulsion) sprayed on the mulch under, and on the lower branches of, holly trees was effective for about 31 days.

1756. JEREMIAS, K.
Über den Jahresgang einiger Zucker in den Blättern von *Hedera helix* L. **(On the annual rhythm of some sugars in the leaves of ivy.)**
Planta, 1958, **52**: 195-205, bibl. numerous.

Sucrose was the dominant sugar all the year round, but showed a distinct increase in the cold season and a maximum in late winter. On the whole, the leaves showed a pronounced sugar maximum in winter, due largely to the presence of non-reducing oligosaccharides.—Bot. Inst. tech. Hochsch. Stuttgart.

1757. HARAMOTO, F. H., AND BOYLE, W. W.
Control of the cyclamen mite on *Jasminum sambac*.) Ait. in Hawaii.
J. econ. Ent., 1958, **51**: 431-3, bibl. 4.

In experiments conducted during March and April, 10% endrin w.p. and 25% parathion w.p., both at 2 lb./100 gal., and Metacide emulsifiable concentrate (e.c.) at 2 qts/100 gal. gave 40 to 50% control of cyclamen mite (*Steneotarsonemus pallidus*) on *Jasminum sambac*. The materials used at half of these concentrations gave poorer control. Parathion and Metacide were phytotoxic at both concentrations, whereas endrin was harmless. When endrin e.c. was applied by growers at 1 pt/100 gal. every 2–3 weeks complete control of the mite was obtained within 2 months. The continued use of endrin e.c. has apparently exterminated the mite in all commercial plantings, though some unknown ecological factors may also have contributed to their disappearance.—Hawaii agric. Exp. Stat., Honolulu.

1758. Hoyos, F. G.
Schildlausbekämpfung an Lorbeerbäumen. (Control of scale insects on laurel.)
Gartenwelt, 1959, **59**: 4.

Two sprays of 1·5% summer oil, applied in mid-November and mid-December, resulted in 89·3% mortality of *Coccus hesperidum* on laurel. Three sprays of E 605 (0·035%) were unsatisfactory owing to the low temperature during treatment. For foliage pot plants 2 sprays of malathion, 10 to 14 days apart, have given good control of scale.

1759. Griesel, W. O., and Biale, J. B.
Respiratory trends in perianth segments of *Magnolia grandiflora*..
Amer. J. Bot., 1958, **45**: 660-3, bibl. 12, illus.

Oxygen uptake by perianth segments of *Magnolia grandiflora* was studied in relation to the unfolding of the flower. A rapid rise in the oxygen uptake was observed immediately after bud opening. The effect was more pronounced in early morning than in late afternoon samples, resulting in a definite diurnal pattern in respiration rates. The endogenous rhythm became less pronounced as the flower aged. Histological examinations were also carried out on samples at different stages of development. [From authors' summary.]—Univ. Calif., Los Angeles.

1760. Enright, L. J.
Response of *Metasequoia* cuttings to growth-regulator treatments.
Bot. Gaz., 1958, **120**: 53-4, bibl. 3, illus.

Cuttings of *Metasequoia glyptostroboides* were set under mist in June, July and August. In an untreated group the August cuttings died, and only light rooting occurred in 36% of the July and 42% of the June cuttings. The best results were obtained by treatment with 20,000 p.p.m. IBA in distilled water, when 90% of the June and all the July cuttings rooted heavily, and all the August cuttings very heavily. Next in effectiveness came a mixture of 0·8% IBA and 15% thiram, giving medium rooting in 86% of the June and 98% of the July cuttings, and very heavy rooting in 100% of the August cuttings. Mixtures of 2,4,5-T and NAA sodium salt gave poor results.—Univ. Md, College Park.

1761. Simmonds, F. J.
The effect of lizards on the biological control of scale insects in Bermuda.
Bull. ent. Res., 1958, **49**: 601-12, bibl. 2.

Predacious lizards, *Anolis* spp., have been shown to be the cause of failure of the biological control of scale insects of oleander as they consume the coccinellids which were established to control the scale. The introduction of predacious birds to control the lizards is planned.—Commonw. Inst. biol. Control.

1762. Fine, J. M., and Barton, L. V.
Biochemical studies of dormancy and after-ripening in seeds. I. Changes in free amino acid content.
Contr. Boyce Thompson Inst., 1958, **19**: 483-500, bibl. 20.

The free amino acid contents of embryo and endosperm during the after-ripening of the epicotyl of tree peony at 5° C. were compared with those of non-after-ripening seedlings in the greenhouse [see also *H.A.*, 29: 765]. Alanine and glutamine were present in greater quantities in the embryos and endosperm of seeds held at 5° C. than of those in the greenhouse. Embryos at 5° C. contained more glutamic acid and valine, and endosperm material at 5° C. more serine and possibly more glycine. On the other hand, asparagine, phenylalanine and tyrosine contents of embryos were greater in the seedlings at greenhouse temperature than in those at 5° C. Amino acids which did not appear to be affected by temperature treatment of the seedlings were γ-amino-butyric acid, aspartic acid, leucine, lysine, proline and threonine; comparable increases in quantity with increased time after planting were noted in the greenhouse and at 5° C. Arginine and unidentified substance(s) were present in large quantity but were not separated by the procedures used. The amino acid contents of seedlings treated with gibberellic acid to break epicotyl dormancy in the greenhouse without low temperature pretreatment showed trends resembling those of the greenhouse controls (non-after-ripened seedlings) rather than those after-ripened at 5° C., except for alanine which followed the same pattern as seedlings after-ripened at the low temperature. The possible significance of these findings in relation to the breaking of dormancy is discussed. [Authors' summary.]

1763. Taylor, J. A.
London's plane. Some notes and observations.
Gdnrs' Chron., 1958, **144**: 253, illus.

The London plane tree, *Platanus acerifolia*, is believed to be a hybrid between *P. occidentalis* and *P. orientalis*. Some of its characteristics are discussed, and in addition it is noted that leaves on parts of trees that were in the immediate vicinity of overhead street lights were held in the autumn for about 14 days longer than were leaves on other parts of the trees that were farther away from the lights. J.R.L.

1764. Payne, R. N.
White poinsettia flowering possible for Easter season.
Flor. Exch., 1958, **131** (20): 18.

Cuttings from white poinsettia mother plants were taken on 12 December, and were rooted, potted and hardened off with supplementary light to provide long-day conditions. Short-day treatment was started during the second half of January, and the plants flowered about 9 weeks later.—Okla. St. Univ.

1765. Kuchlenz, F.
Untersuchungen über die günstigste Wurzelstecklingslänge und -stärke bei der vegetativen Vermehrung von Pappeln der Section *Leuce* durch Wurzelstecklinge. **(Studies on the most favourable length and thickness of root cuttings in the vegetative propagation of poplars (Section *Leuce*).**
Züchter, 1958, **28**: 336-43, bibl. 6, illus.

Satisfactory regeneration was obtained with *Populus tremula* root cuttings 12 cm. long with diameters up to 1·7 cm. Root cuttings of *P. canescens* 4 cm. long, with diameters of 0·5–1·7 cm., also grew satisfactorily, as did cuttings 12 cm. long, with diameters of not less than 0·3 cm.—Inst. Forstwiss., Berlin.

1766. Byrnes, W. R., Gerhold, H. D., and Bramble, W. C.
Douglas fir. Varietal tests for Christmas tree plantations in Pennsylvania.
Progr. Rep. Pa agric. Exp. Stat. **198,** 1958, pp. 6, bibl. 13, illus.

The growth of 3 varieties of *Pseudotsuga menziesii* in several test plots was evaluated for the Christmas tree market. Survival of the blue variety (*glauca*) was best, and that of the grey variety (*caesia*) was almost as good, while survival of the green variety (*viridis*) was lowest. Survival was considered to be related to seed source, site of planting and cultural treatments rather than to differences in growth zones. Winter injury was largely responsible for the high mortality rate of the green variety, and the other varieties were also damaged by cold. The grey and blue varieties were slower-growing than the green variety.

1767. Royal Horticultural Society.
The rhododendron and camellia year book, 1959, No. 13.
R.H.S., London, 1958, 9×5½ in., pp. 156, illus., 10s.+1s. 3d. postage, or U.S.A. $1.65 post free.

Several Scottish rhododendron collections are described, including those at the Royal Botanic Gardens, Edinburgh, several gardens of Lochfyneside, and the dwarf rhododendrons at Branklyn, Perth. There are also articles on the "Wilson Fifty" Kurume azaleas, on alpine rhododendrons which were moved to Windsor Great Park, and on the rhododendron nursery garden at Linswege in north-west Germany. Notice is given of a worldwide study of camellia cultivars which is to be undertaken at Cornell University. Camellias grown in California are described in 2 articles. Rhododendron and camellia shows in Britain and North America are reported, with notes on new camellias from Australia and New Zealand.

1768. Treuheit, A.
Azaleenveredlungen unter Folie. **(Propagating azaleas under plastic sheets.)**
Gartenwelt, 1958, **58**: 314-15, illus.

Excellent results were obtained after covering newly-grafted, benched azaleas with transparent plastic sheets, which rested on the plants. Labour for watering and the need for temporary shading were reduced, and all the grafts united.

1769. Enright, L. J.
Growth responses of field-tested azaleas.
Amer. Nurserym., 1958, **108** (11): 12, 39-43, illus.

Nine media were tested for growing Hinodegiri azaleas, with or without fertilizer (21-7-7), in the field. The plants were shaded, watered and mulched in the first year. Peat moss or soil / peat moss mixtures with fertilizer produced the best growth. Sand or sawdust were not suitable for azaleas. More than 2 successive applications of fertilizer in a year resulted in excessive brittleness of wood. There was little difference in growth between plants in beds 6 in. deep and those in beds 12 in. deep. Soil conditioner appeared to have retarded growth. In fertilized plants leaf and flower condition was much better than in unfertilized plants.—Univ. Md, College Park.

1770. Dänhardt, W., and Bowe, R.
Zur Verwendung von Schwarztorfen für die Kultur von Azaleen (*Rhododendron indicum* L.). **(The use of black peat in azalea culture.)**
[Russian and English summaries ½ p. each.]
Arch. Gartenb., 1958, **6**: 311-44, bibl. 9, illus.

The effect of black peat from 2 sources on the growth and flowering of azaleas was studied using several varieties as grafted or own-rooted plants. Pure black peat had a detrimental effect on growth, due to its tendency to become compacted. A 1: 1 mixture with coniferous forest soil produced growth and flowering similar to that in the pure conifer soil.—Inst. Gartenb., Dresden-Pillnitz.

1771. Tod, H.
Rhododendrons and lime.
R.H.S. Rhododendron Camellia Yearb. 1959, No. 13, 1958, pp. 19-24, bibl. 6.

In the leaves of rhododendrons contents of Mg, K and PO_4 tend to be lower than for other plants, and Mg and Fe contents tend to be higher. Levels of Ca are similar to those of other plants, which suggests that rhododendrons are more efficient at collecting Ca than many other genera, and that the problem of rhododendrons in a calcareous soil may be related to excessive Ca uptake. Leaves from plants showing several nutrient deficiency symptoms were found to be low in Mn.—E. Scot. Coll. Agric., Edinburgh.

1772. (Kamp, J. R., and Van Drunen, E.)
Factors affecting propagation of *Taxus cuspidata capitata.*
Ill. St. Flor. Ass. Bull., reprinted in *Flor. Exch.*, 1958, **131** (14): 28, 30.

Tip cuttings of the current season's growth, 8–10 in. long, were taken in October, and, after treatment with several hormones, were rooted under normal day length (short days) or with a 4½-hr interruption of the dark period. Rooting under short days was better than with the interrupted dark period. The best of the hormone treatments was Chloromone [formulation not given], and rooting was best with Chloromone in short-day conditions.

1773. Teuscher, H.
Dwarfing adapts snowball for wider landscape use.
Amer. Nurserym., 1958, **108** (12): 8, illus.

Four-year-old snowball bushes, *Viburnum opulus roseum*, grafted onto *V. opulus nanum* flowered at 2½ ft high. The scions had been whip-grafted onto unrooted cuttings of *V. opulus nanum*, which were set in 50: 50 perlite and peat moss under interrupted mist. Over 90% of the grafts were successful.—Montreal bot. Gdn.

Noted.

1774.

a Abbiss, H. W.
Anemones as a commercial crop. No. 1. The basic requirements in soil and siting. No. 2. Propagation and disease control. No. 3. Picking, bunching and boxing.
Comm. Gr, 1958, No. 3284, pp. 1243-4, illus., No. 3285, pp. 1285-6, and No. 3286, p. 1316.
Winter cultivation of de Caen and St. Brigid varieties in western England.

b Anon.
Pikierkasten aus Kunststoff. (**Pricking-out boxes made of plastic.**)
Gartenwelt, 1958, **58**: 434-5, illus.
Plastic reinforced with fibre-glass.

c Blumhardt, H.
Orchid culture in New Zealand.
N.Z. Plants and Gdns, 1958, **2**: 282-6, 345-51.
Culture, propagation and diseases and pests.

d Bosse, G.
Drei Methoden der Gladiolenkultur. (**Three methods of growing gladioli.**)
Gartenwelt, 1958, **58**: 374-5, illus.
Growing under fixed and mobile glass and in the open.

e Bridgman, F.
Native legumes for gardens.
J. agric. W. Aust., 1958, **7**: 491-4, 497-9, illus.
Notes on indigenous ornamentals which should be more popular.

f Buch, P. O.
Unusual gladiolus species.
Nat. hort. Mag., 1958, **37**: 206-11, illus.
Notes on Eurasian and African species.

g Creech, J. L.
Two ground-covering species of *Ardisia.*
Nat. hort. Mag., 1958, **37**: 266-7, illus.
A. japonica and *A. pusilla* described and compared.

h (Forsberg, J. L.)
Rose diseases and their control.
Flor. Exch., 1959, **132** (1): 17, 19, 33-5, bibl. 36.
Symptoms and control of fungus, bacterial and virus diseases.

i Fosler, G. M.
Flowering gift plants. Their care and how to rebloom them.
Circ. Ill. agric. Ext. Serv. **801,** 1958, pp. 56, illus.
General and specific advice on the care of pot plants.

j (Gasiorkiewicz, E. C.)
Development and maintenance of pathogen-free geraniums.
Flor. Exch., 1958, **131** (24): 14.
By culturing cuttings and establishing foundation and increase blocks.

k (Harris, H. M., and Roberts, D. W.)
Leaf-roller attacks ornamentals in Iowa.
Ia Fm Sci., 1958, **13**: 87.
DDT shows promise of control in *Spiraea* nurseries.

l Heslop-Harrison, J., and Heslop-Harrison, Y.
Long-day and auxin induced male sterility in *Silene pendula,* L.
Portugal. Acta biol., 1958, **5**: 79-94, bibl. 22, illus.
For a preliminary account see *H.A.*, 28: 1033.

m J—, H. J.
Ersatz für Nelkenringe. (**A substitute for carnation rings.**)
Gartenwelt, 1958, **58**: 434, illus.
Artificial sepals are clipped on.

n Janaki Ammal, E. K.
Iso-chromosomes and the origin of triploidy in hybrids between Old and New World species of *Philadelphus.*
Proc. Indian Acad. Sci., Sect. B, 1958, **48**: 251-8, bibl. 9, illus.
All species in nature are diploids (2n=26); factors causing triploidy described [see also *H.A.*, 21: 3916 l.]

o JOHRI, B. M., AND BHATNAGAR, S. P.
A contribution to the morphology and life history of *Aristolochia.*
Reprinted from *Phytomorphology*, 1955, **5**: 123-37, bibl. 34, illus.
Floral morphology and embryology of several species, notably *A. bracteata* and *A. elegans*.

p KELSEY, S. L.
Selected ground cover plants for New England.
Amer. Nurserym., 1958, **108** (6): 96-106.
Notes on many species.

q (KOSAR, W. F.)
Grafted dogwood.
Amer. Nurserym., 1958, **108** (12): 88.
Growing grafted dogwood.
Agric. Res. Wash., 1958, **7** (5): 15.
Also noted in *H.A.*, 29: 773t.

r KOTHS, J. S.
Carnation propagation, culture, insect control.
Flor. Exch., 1958, **131** (19): 47.
General recommendations for glasshouse and field culture in Connecticut.

s KRÜSSMANN, [G.].
Das Philadelphus-Sortiment. (**Horticultural *Philadelphus* varieties.**)
Dtsch. Baumsch., 1958, **10**: 312-22, bibl. 10, illus.

t NAEGELE, J.
Lily aphid control.
Bull. N.Y. St. Flower Grs, 1958, No. 155, pp. 1, 4.
With demeton, sulfotepp, lindane or malathion.

u N.S.W. DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Diseases of irises.
Agric. Gaz. N.S.W., 1958, **69**: 482-6, illus.
Diseases of both rhizomatous and bulbous irises described, with notes on control.

v (PARIS, C., AND HANEY, W. J.)
Petunia trial results at Michigan State University.
Flor. Exch., 1958, **131** (26): 38.
Many grandiflora and multiflora varieties listed by colour.

w POWELL, E. N., AND ANDREASEN, R. C.
MH found to delay terminal bud growth.
Flor. Exch., 1958, **131** (13): 12.
For a more detailed account see *H.A.*, 28: 1700.

x PUSSARD, R.
À propos des nématodes des cultures florales. (**With regard to nematodes of flower crops.**)
C.R. Acad. Agric. Fr., 1958, **44**: 688-93, bibl. 10.
A review of control measures in the south of France, particularly for carnations.

y RAPTOPOULOS, T., AND KANTARZIS, N.
The season and period of flowering of ornamental trees and shrubs grown at the Thessaloniki University Farm. [Greek, with English summary 13 lines.]
Reprinted from *Geoponika*, 1958, No. 49, pp. 270-7, bibl. 3.
Flowering periods of 39 species tabulated and correlated with climatic conditions over 4 years.

z RICHTER, P.
Über die Lagerung von Blumenzwiebeln in Obstlagerhäusern. (**Storage of bulbs in fruit stores.**)
Dtsch. Gartenb., 1958, **5**: 286-8, illus.
Method of adapting a fruit store described.

1775.

a ROCHFORD, T.
House plants.
J. roy. hort. Soc., 1958, **83**: 466-75, illus.
Notes on general care and plant species.

b ROSE, G.
Innovations speed nursery procedures.
Amer. Nurserym., 1958, **108** (5): 9, 32-40, 92-6, illus.
New machines and methods for field, packing shed, store and office.

c RUPPRECHT, H.
Die heimatlichen Standortfaktoren der *Gerbera jamesonii* und ihre Beziehungen zu unseren Kulturmassnahmen. (**Natural environmental conditions of *Gerbera jamesonii*, and their relation to our cultural measures.**)
Dtsch. Gartenb., 1958, **5**: 312-13, illus.
Climatic data are considered in detail.

d SALIMEI, S.
La sansevieria, pianta amica della casa. (**Sansevieria, a useful house plant.**)
Ital. agric., 1959, **96**: 44-8, illus.
Information on species, propagation and general and hydroponic culture.

e SALIMEI, F. S.
Philodendron, una pianta che vive nelle nostre case. (**Philodendron, a plant that will live in the house.**)
Ital. agric., 1958, **95**: 878-84, illus.
Descriptions and brief cultural notes on *Philodendron* and related genera.

f SALINGER, J. P.
Irises in the flower garden.
N.Z. J. agric., 1958, **97**: 491-9, illus.
Types and culture, pests and diseases in New Zealand.

g Shanks, J. B.
Fertilizing effectively.
Flor. Exch., 1958, **131** (12): 17, 34-5.
Recommendations on fertilizing various ornamentals.

h Sherratt, H. S. A.
The relationship between anthocyanidins and flavonols in different genotypes of *Antirrhinum majus.*
J. Genet., 1958, **56**: 28-36, bibl. 15.
Chemistry of flower pigments.

i Snow, R.
Phyllotaxis of *Kniphofia* and *Lilium candidum.*
New Phytol., 1958, **57**: 160-7, bibl. 12, illus.

j Sorensen, H. B., DeWerth, A. F., and Jensen, E. R.
Production methods and new markets for Texas florist crops.
Bull. Tex. agric. Exp. Stat. **900,** 1958, pp. 20, illus.
Marketing small, high quality pot plants, with details of costs and production programmes for individual species.

k Tachibana, Y.
Studies on *Hibiscus* (III.) An interspecific hybrid of *H. mutabilis* L. and *H. moscheutos* L. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1958, **27**: 201-6, bibl. 11, illus.
Some promising ornamentals in the F_1 generation.

l de Vos, F.
Sasanqua camellias, their introduction, culture, and use.
Nat. hort. Mag., 1958, **37**: 228-40, bibl. 6, illus.
Including recommended varieties.

m Waffenschmidt, H.
Erfahrungen über den Anbau von Treib-Antirrhinum. (**The culture of forced snapdragons.**)
Schweiz. Gärtnerztg, 1958, **61** (50): 1-3, illus.
Varieties and methods in Switzerland.

n Weinstein, L. H., Porter, C. A., and Laurencot, H. J., Jr.
Evidence for the conversion of quinic acid to shikimic acid in roses.
Nature, 1959, **183**: 326, bibl. 7.
In the flowers.

o Wells, J. S.
Efficient media for plant propagation.
Amer. Nurserym., 1958, **108** (9): 14, 92-4.
Observations on rooting media for cuttings of conifers and rhododendrons.

p Wen, P. F.
Notes sur les pivoines de Chine. (**Notes on the peonies of China.**)
Ann. Soc. nat. Hort. Paris, 1958, No. 15, pp. 434-41, illus.
Descriptions of 12 species and their varieties.

q Winkels, —.
Die technische Einrichtung von Tulpenbewurzelungsräumen. (**Technical organization of tulip rooting rooms.**)
Gartenwelt, 1958, **58**: 413-14.
A thermostatically controlled fan suggested.

r Wyman, D.
The shrub altheas.
Arnoldia, 1958, **18**: 45-51, illus.
Varieties of *Hibiscus syriacus* and *H. rosa-sinensis* described briefly.

s Wyman, D.
Woody plants with interesting bark in winter.
Arnoldia, 1958, **18**: 57-64, illus.
Some 150 species growing in the Arnold Arboretum.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Avocadoes.

(*See also* 1824, 1870i, k, m, u, y, 1873.)

1776. Zentmyer, G. A., and others.
Hot-water treatment of avocado seed.
Yearb. Calif. Avoc. Soc. for 1958, pp. 108-10, bibl. 2.

Experiments on the hot-water treatment of avocado seeds to control *Phytophthora cinnamomi* have indicated that: 1. Seed may be safely treated for 30 min. at 115°, 120° and 125° F., but at 130° F. some varieties may be severely injured. 2. Seed coat removal before treatment had no effect on either rate or percentage of germination. 3. Cutting the seed before planting markedly increased the rate of germination. 4. Storing treated seed for 2 months did not significantly reduce germination. —Univ. Calif., Riverside.

1777. Frolich, E. F., Schroeder, C. A., and Zentmyer, G. A.
Graft compatibility in the genus *Persea*.
Yearb. Calif. Avoc. Soc. for 1958, pp. 102-5, bibl. 7, illus.

In reciprocal interspecific grafting trials involving 17 species all the material tested was found to be compatible with either *Persea americana* or *P. borbonia* but never with both. Immunity or resistance to *Phytophthora cinnamomi* was shown only by species compatible with *P. borbonia.*—Univ. Calif., Los Angeles and Riverside.

1778. RICHMOND, A. E., AND WALLACE, A.
Effects of nitrogen, antiauxin, and aeration on avocado seedlings grown in solution culture.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 149-54, bibl. 1.

Avocado root development was increased by the application of the anti-auxin α-1-naphthyl-methyl sulphide propionic acid with high N solutions and decreased by it with low N solutions. The top: root ratio decreased with an increase in aeration and with a decrease in N. The percentage of N in the leaves decreased consistently with decreased aeration in both high and low N solutions.

1779. EMBLETON, T. W., AND OTHERS.
A progress report on cooperative avocado nitrogen fertilizer experiments.
Yearb. Calif. Avoc. Soc. for 1958, pp. 111-13, bibl. 1.

The results to date of fertilizer trials in 6 orchards, in which 4 rates of N have been applied to 4 varieties, support previous findings [*H.A.*, 26: 2055], which suggested that the highest yields are generally associated with moderate levels of N in the leaves.

1780. BERGH, B., AND GUSTAFSON, D.
Fuerte fruit set as influenced by cross-pollination.
Yearb. Calif. Avoc. Soc. for 1958, pp. 64-6, bibl. 4.

Rows of Fuerte trees adjoining rows of Topa Topa set about 2½ times as many fruits as Fuerte trees one or more rows removed from Topa Topa interplants. Hass trees, which generally flower later, improved fruit set in Fuerte to a lesser extent.

1781. SCHROEDER, C. A.
Growth and development of the avocado fruit.
Yearb. Calif. Avoc. Soc. for 1958, pp. 114-18, bibl. 2.

Avocado fruit exhibits certain unusual morphological and physiological characteristics. The seasonal growth curve is sigmoid, but there are diurnal fluctuations of day contraction and night expansion, which, under extreme weather conditions, may be quite large [see also *H.A.*, 27: 3820]. Fruit growth throughout the season is determined to a large extent by cell division at nearly all stages of development.—Univ. Calif., Los Angeles.

1782. BEAN, R. C.
Changes in sugars during growth and storage of avocados.
Yearb. Calif. Avoc. Soc. for 1958, pp. 90-3, bibl. 7.

In fruits of the variety Zutano and of a Mexican seedling the chief sugars formed during growth were found to be glucose, fructose, mannoheptulose and sucrose, together with the alcohol perseitol. During storage the content of sugars, and especially of ketoses, declined, while several pentoses (xylose, arabinose and ribose), a xylo-disaccharide and the alcohols mannitol and glycerol appeared.—Univ. Calif., Riverside.

1783. FLESCHNER, C. A.
The effect of orchard dust on the biological control of avocado pests.
Yearb. Calif. Avoc. Soc. for 1958, pp. 94-8, bibl. 1, illus.

The accumulation of dust deposits, arising from unpaved roads, ditch-digging, etc., inhibits the activity of beneficial insects and consequently increases pest damage. The results are given of laboratory and field studies on the effect of inert dust deposits on the predator *Stethorus picipes* and on the parasite *Trichogramma minutum*.—Univ. Calif., Riverside.

1784. FOUNTAIN, J. B., AND STOKES, D. R.
Evaluation of shipping containers for Florida avocados.
Mktg Res. Rep. U.S. Dep. Agric. **228**, 1958, pp. 26, illus.

Two standard containers are permitted for the shipment of avocado pears from Florida, a 1-layer flat [tray] holding ¼ bushel, and, for fruit weighing 20 oz. or more or measuring 3⅞ in. or more in diameter, a multilayer ¾-bushel container. During the 1956/57 season 60 test shipments were made to New York and Chicago, in which 4 standard ¼-bushel flats (3 fibreboard and 1 wood-slatted), 2 standard ¾-bushel boxes (1 fibreboard carton and 1 wooden wirebound box) and 2 non-standard ⅕-bushel trays (both fibreboard) were compared. Data were recorded on compression tests on the containers, the condition of the fruit and the containers on arrival, trade reactions to the containers, and the costs of the containers, other packing materials and labour. In general, the condition of all the containers on arrival at market was satisfactory, and there was no evidence that a change from ¼- to ⅕-bushel flats would be beneficial. Both fibreboard and wooden containers were comparable in cost and both suffered from slight defects, though not to an extent which would suggest definite superiority for one or the other. The condition of the fruit, in which 46 varieties were represented, was satisfactory apart from minor bruises and discoloration. These defects were least when the pack was tight, when there was headroom between the fruit and lid, and when moderate amounts of excelsior [wood wool] were well distributed along the sides and in the corners of the containers.

Carobs.

1785. GOOR, A., TICHO, R. J., AND GARMI, Y. G.
The carob. [Hebrew, with English summary 3¼ pp.]
Agricultural Publications Section, Ministry of Agriculture, Hakirya, Israel, 1958, pp. 72+4, bibl. 22, illus.

The carob is polygamous, with male trees, female trees, and trees with male and hermaphrodite flowers. None of the female trees has functional pollen; therefore interplanting with male trees is necessary. Limiting climatic conditions are frost, excess dew and drought; the tree will grow in a wide range of soils provided they are not shallow, and are well drained. Carobs may be propagated by seeds, cuttings, suckers, layers and air-layers. In irrigated orchards the planting of budded trees has proved successful. The carob varieties grown in Israel are described.

1786. Raz, D.
Airwrap rooting of carob cuttings.
Yearb. Calif. Avoc. Soc. for 1958, pp. 69-71, illus.

Carobs, difficult to propagate by small leafy tip cuttings, have been air-layered without using growth substances in Israel. After removing a ring bark about 1 in. wide from shoots $\frac{1}{4}$–$\frac{3}{4}$ in. in diameter, moist sawdust with fine wood shavings was packed round the cut and the whole enclosed in polythene film. August proved the best month for ringing, and 84% of the marcots made during mid-August rooted compared with only 39% of those made in mid-September.

Citrus—general.

(*See also* 1020, 1870o, x, 1871a, 2001.)

1787. Isaac, E.
Influence of religion on the spread of citrus.
Science, 1959, **129**: 179-86, bibl. 39, illus.

The origin and spread of the citron in the Mediterranean area are described, and the wide cultivation of this tree is attributed to the influence of Jewish religious practice. The citron was traditionally used in the Feast of Booths. The Jews also assisted in the introduction and spread of other citrus species.—Temple Univ., Philadelphia, Pa.

1788. Burkhart, L.
Arizona citrus notes.
Calif. Citrogr., 1959, **44**: 96-7.

Fruit set of tangerines and navel oranges was scarcely improved by foliar sprays of N alone, N plus P plus K, or Zn plus Mn. Knife girdling and hormone sprays were also ineffective, but removal of a ring of bark did increase set. Autumn and winter picking of grapefruit has increased fruit set in the next crop in comparison with early summer harvesting or with ring picking throughout the year. A gin trash mulch round young navel trees reduced water loss from the top 3 ft of soil, so that the irrigation interval could be increased from 16 to 25 days. DBCP fumigation is recommended for nematode control.—Dep. Hort., Univ. Ariz.

1789. Chen, Z., and Dragavcev, A. P.
Fruit growing on embankments in China. [Russian.]
Priroda, 1958, **47** (11): 95-6, illus.

Where high water tables and/or periodic flooding occur in southern China, citrus is grown on banks or mounds, about 0·5 m. high. The cultivation of mandarins and oranges is particularly complicated in parts of Kwantung where 2 to 6 floodings may occur in early summer. There, to encourage shallow rooting, the main root of the nursery stock is twisted into a loop, which also induces early bearing, and the level of the drainage canals is maintained to provide a water table 40 cm. below the soil surface.

1790. Chen, Z., and Dragavcev, A. P.
Hastening the onset of fruiting in fruit trees. [Russian.]
Sad i Ogorod, 1958, No. 12, pp. 60-1, illus.

In the Kwantung province the mandarin varieties Ponkan and Tankan are grafted on *Citrus sunki* and *C. microcarpa*. To induce early bearing and, where the water table is high, to encourage shallow rooting the tap root is tied into a loop before the plants are set out in the nursery.—Peking agric. Acad.

Citrus—varieties, propagation and rootstocks.

(*See also* 1797-1800, 1870a, f, p, z.)

1791. Šanidze, —.
The red-fleshed orange Korolek No. 1 and an early Unshiu mandarin. [Georgian.]
Izv. Batum. bot. Sada AN GruzSSR, 1956, No. 6, pp. 157-9, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 11,054.

Both, developed at Batumi, showed high frost resistance during the severe winter of 1949/1950. The orange has a very good flavour and keeping quality, while the mandarin, a bud sport of the seedless Unshiu, ripens 15–20 days earlier than the parent form.

1792. (Bitters, W. P.)
Valencia strain trials.
Calif. Citrogr., 1958, **44**: 61-3, illus.

In trials at the University of California Citrus Experiment Station tree and fruit sizes were larger and yields were up to 25% greater with seedling-line Valencias than with old-line trees, although the seedling-line trees were slower to come into bearing. Seedling-line trees are also free from recognized virus diseases.

1793. Shing, K. C., and Sha, S. S.
Studies on airlayering of grapefruit. [Chinese, with English summary $1\frac{1}{2}$ pp.]
J. agric. Ass. China, 1956, No. 15, pp. 67-74, bibl. 10, illus., [received 1959].

Marcots were made using 3 types of moisture-holding material, viz. garden soil, cattle manure plus loam, and fresh moss. NAA and 2,4,5-T, each at 3 levels, were applied in lanolin. Good rooting was obtained with garden soil plus NAA at 200 and 300 p.p.m. and with 2,4,5-T at 50 p.p.m., and also with moss plus NAA at 200 p.p.m. and with 2,4,5-T at 200 p.p.m.

1794. KHAN, M. D., AND KHAN, M. A.
Influence of propagational methods on the productivity and vigour of sweet lime (*Citrus aurantifolia,* Swingle).
Pakist. J. sci. Res., 1958, **10**: 8-13, bibl. 17, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-23.

Seedlings were most vigorous but yielded least. Plants propagated from cuttings were more precocious than budlings, but the latter eventually yielded most. Data on trunk girth, height, spread, flowering and yield are given.

1795. WALLACE, A.
Some characteristics of citrus fruits on different rootstocks in the U.C.L.A. orchard.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 125-8, bibl. 6.

Juice contents, anhydrous citric acid, soluble solids and yields are tabulated for orange, lemon and grapefruit varieties growing on 5 rootstocks, together with yields per tree.

1796. GARDNER, F. E., AND HORANIC, G. E.
Influence of various rootstocks on the cold resistance of the scion variety of citrus.
Proc. Fla St. hort. Soc., 1958, 1959, **71**: 81-6, bibl. 2, and *Citrus Ind.*, 1958, **39** (12): 9-10, 23, bibl. 2.

In general cold-resistant rootstocks induced cold resistance in the scion variety (Valencia). There were, however, exceptions to this effect, in that some cold-resistant stocks imparted cold susceptibility or *vice versa.* It is suggested that the effect of the rootstock on cold resistance is an expression of the degree of dormancy produced in the scion.—Agric. Res. Serv., U.S.D.A., Orlando.

Citrus—temperature and water responses.

(*See also* 1014, 1804, 1870n.)

1797. ONGUN, A. R., AND WALLACE, A.
Inorganic composition of small Washington Navel orange trees on different rootstocks grown in a glasshouse with different root temperatures.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 75-83, bibl. 6.

In general, dry weights of Washington Navel oranges on rough lemon, sour orange, trifoliate orange and Troyer citrange stocks increased with increasing soil temperatures, and there were no apparent interactions between rootstock and temperature. Leaf and stem contents of K also tended to increase, but rootlet contents decreased with increasing soil temperatures. The K contents of all plant parts were generally lower on rough lemon than on other stocks. Calcium contents of leaves and rootlets were highest at 72° F., but Ca contents of the stems decreased with increasing temperatures. There was a tendency for leaf Mg to increase, and for rootlet Mg to decrease, with increasing temperature. Phosphorus contents were higher at 72° F. and 88° F. than at 56° F. in both leaves and rootlets. With sour orange stocks P contents of leaves and rootlets were lower than with the other rootstocks; with rough lemon stocks rootlet P was considerably higher than with the other stocks. There were no temperature differences for Mn contents of leaves, but at 88° F. stem contents of Mn were higher than at the lower temperatures. Leaf Mn and Fe contents were higher on rough lemon and sour orange stocks than on trifoliate orange and Troyer citrange stocks. The Fe content of leaves on rough lemon and sour orange stocks increased between 56° and 72° F., but decreased again at 88° F.

1798. ONGUN, A. R., AND WALLACE, A.
Influence of root temperature on the growth of small Washington Navel orange trees on three different rootstocks in a glasshouse.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 84-6, bibl. 1.

The growth of small Washington Navel orange trees on trifoliate orange and Troyer citrange increased with increases in root temperature from 65° to 88° F. At 65° and 88° F. trees on sour orange were smaller than those on the other rootstocks at the same temperature.

1799. ONGUN, A. R., AND WALLACE, A.
Transpiration rates of small Washington Navel orange trees grown in a glasshouse with different rootstocks and at different root temperatures.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 87-103, bibl. 22.

The highest rates of scion leaf transpiration occurred in trees on rough lemon, trifoliate orange and Troyer citrange stocks, and the lowest rates in trees on sweet orange, Cleopatra mandarin and sour orange; on grapefruit stocks transpiration rates were intermediate. Water loss per unit weight of dry roots was greatest on rough lemon, and least on sour orange, Cleopatra mandarin and grapefruit. In general, variations in root temperature made little difference to transpiration rates with stocks which induced high rates. Plant responses to root temperature changes were more pronounced between 54° and 72° F. than between 72° and 90° F.

1800. NAUDE, C. J.
The influence of rootstock and temperature on nutrient accumulation in citrus grown in solution culture.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 104-25, bibl. 26.

Eureka lemon scions on 4 stocks grown in nutrient culture showed little growth at a constant root temperature of 65° F. Maximum growth was obtained at 75° F., and growth at 90° F. was only slightly less than at 75° F. Growth on rough lemon and trifoliate orange was more vigorous than on grapefruit and sweet orange. On a fresh weight basis, the top: root ratios with rough lemon and trifoliate orange were highest at 75° F. and lowest at 90° F. With grapefruit and sweet orange stocks the ratios were highest at 65° F. and lowest at 75° F. There were no outstanding differences in plant composition due to rootstock. The N content of all plant fractions tended to decrease with increasing root temperature. Contents of P, K, Ca and Mg fluctuated according to temperature and to the fraction analysed. The ratio of N: P absorbed increased with temperature. Relatively more K than Ca was absorbed as the temperature increased from 65° to 75° F., but with a further increase in temperature from 75° to 90° F. relatively more Ca than K was absorbed.

1801. Yoshimura, F., and Iwakawa, T.
Ecological studies of citrus trees. III. Respiration and translocation in relation to temperature. [Japanese, with English summary 16 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 55-8, bibl. 3.

Within the range of 0–40° C. the respiration rate almost doubled with each increase of 10° C., though differing somewhat in different species. The greatest increase occurred in Yuzu followed by Unshiu, and the least in lemon.

1802. Tatarišvili, —.
The effect of the winter of 1949/1950 on the productivity of navel oranges in the Batumi botanical garden. [Georgian.]
Izv. Batum. bot. Sada AN GruzSSR, 1956, No. 7, pp. 121-3, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 11,055.

A study was made in 1950-1952 on the damage sustained by 178 Washington Navel trees planted in 1936. The injured trees were divided into 4 groups ranging from 97–100% leaf fall and no crop to 15–20% leaf fall and a reasonably high yield, i.e. 102 fruits/tree. Organic matter (peat) and mineral fertilizers applied in the spring greatly hastened recovery.

1803. Georg, J. G.
Wind machines for frost protection in Florida.
Proc. Fla St. hort. Soc., 1958, 1959, **71**: 92-4, and *Citrus Ind.*, 1958, **39** (11): 7, 9, 14.

In tests in Florida wind machines gave most protection when there was practically no natural wind and a good inversion, and when air temperatures increased from below freezing at ground level to above freezing at 28 ft. The effectiveness of the wind machines decreased rapidly as the natural wind velocity increased and as the temperature at the height of the fan fell below freezing. [See also *H.A.*, 28: 4045h.]

1804. Horanic, G. E., and Gardner, F. E.
Effects of sub-freezing temperatures on the viability of citrus seeds.
Proc. Fla St. hort. Soc., 1958, 1959, **71**: 79-81, bibl. 2, and *Citrus Ind.*, 1959, **40** (1): 12A–12B, bibl. 2.

Seeds of sweet orange kept at constant temperature for 24 hours were not injured at 25° F., were partially damaged at 20° F. and were practically all killed at 15° F. Seed viability was not reduced after fruits of several varieties had been exposed to 28° F. for 12 hours. There was some reduction in the viability of seeds of Cleopatra mandarin and sour orange after fruits had been exposed for 12 hours to 18° F., but the seeds of treated rough lemon and sweet orange fruits were not affected. The viability of both sweet and sour orange seeds was lowered by 14 days of fermentation following the thawing of badly-frozen fruit. Seeds of rough lemon and Cleopatra mandarin did not appear to be affected by fermentation.—Agric. Res. Serv., U.S.D.A.

1805. Fujita, K., and others.
The effects of soil moisture and fertilizer applications on the growth of Satsuma orange nursery trees and persimmon trees. Parts 1 and 2. [Japanese, with English summaries 9 and 10 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 1-6, illus.

Satsuma orange trees were grown in pots, in which the soil moisture was maintained at 15%, 30%, 45% or 100% of field capacity, with or without N and K fertilizers. Optimum growth of tops and roots occurred when the soil moisture was 30-45%. Leaf analysis showed the uptake of nutrients to be best when soil moisture was 30%. In a second experiment the weight of tops and roots and the leaf N, P, K, Ca and Mg contents were measured in young persimmons grown in pots, in which the soil moisture was maintained at 15%, 30%, 45% or 60%, and to which 0, 2·5 or 5 g. potassium sulphate had been added. The best growth and the highest figures for leaf N, P, and K were obtained when the soil moisture was 30%, but the leaves contained more Ca and Mg when it was 15%. Leaf composition was more affected by soil moisture conditions than by the application of K fertilizer. J.R.L.

1806. Husain, A., and Cooper, W. C.
Cambial activity in grapefruit trees as influenced by winter irrigation.
Amer. J. Bot., 1958, **45**: 517-19, bibl. 6, illus.

Grapefruit trees on sour orange rootstocks in

Texas were irrigated either 9 times or only once from October to February. The total quantity of water used was 18 times as great for the first as for the second group, which received a light application in mid-November to prevent defoliation. No further signs of wilting occurred in the "dry" trees, but their shoot growth was completely inhibited. Cambial cells in both groups of trees produced secondary tissues, but activity in the "dry" group was retarded, and by January their bark could be separated from the wood much less readily than that of the frequently irrigated trees.—U.S. Dep. Agric., Weslaco, Texas.

Citrus—soil management and nutrition.

(*See also* 1350, 1868, 1870 l, r, 1871b, c.)

1807. Ogaki, C., and others.
Studies on sod culture in a Satsuma orange orchard. (1) The effect of three years' treatment on tree growth, fruit development and soil. [Japanese, with English summary ¼ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 11-19, illus.

After three years' clean cultivation, sod treatment or mulching in a citrus orchard no differences were found in tree vigour, fruit quality or storage quality. But shoot growth was shorter and the fruit ripened about 10 days later in trees on the sod treatment plots than in trees on the other plots. Additional applications of N to the sod plots in the autumn delayed the colouring of the fruit, but normal applications of N caused the fruit to ripen earlier than on the other plots. J.R.L.

1808. Urušadze, U. D.
The growth and development of young lemon plants under various conditions of soil management in the interrows. [Russian.]
Bjul. Vses. n.-i In-ta Čaja i subtrop. Kul'tur, 1956, No. 4, pp. 55-71, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,823.

In a 3-year trial comparing different methods of soil management the best developed lemon plants were obtained from organic mulching without disturbing the soil, and the worst from perennial cover crops, which dried out the soil. The most vigorous root systems developed under organic and black paper mulches, and the least under a grass sod. Mulching with organic materials, at the same time leaving the soil undisturbed, is considered to be the most satisfactory method, giving results similar to those of clean cultivation in the summer with green manure crops in the winter.

1809. Wallace, A.
Root cation exchange capacity in explaining rootstock influence on cation content of citrus.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 129-35, bibl. 13.

A tentative mathematical relationship is postulated between the root cation exchange capacity (C.E.C.) of the stock and the uptake of cations, particularly K, Ca and Mg. This implies that root C.E.C. affects the ratio of cations absorbed. The usefulness and possible limitations of the equations, e.g. to explain scion influence on mineral composition, are discussed.

1810. Huffaker, R. C., and Wallace, A.
Variation in root cation exchange capacity within plant species.
Agron. J., 1959, **51**: 120, bibl. 4.

Factors causing differences in root C.E.C. values and the effect of root C.E.C. on cation absorption are discussed. Figures are given for root C.E.C. of a number of plants, including rough lemon.—Univ. Calif., Los Angeles.

1811. Bedrikovskaja, N. P.
The effect of fertilizers on the percentage set and the development of mandarin fruits. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 2, pp. 79-85, from *Ref. Ž.* (*Biol.*), 1958, No. 3, Abstr. 11,057.

At Soči, on podzolic soils treated with lime and organic fertilizers, high rates of N increased yields. The best results were obtained when NPK was applied in April and 2N1P in June. High rates of P and low N retarded the growth and development of newly set fruit and reduced the size of maturing fruit.

1812. Rasmussen, G. K., and Smith, P. F.
Effect of subsoil type and pH on growth and macronutrient level of leaf tissue of Pineapple orange seedlings.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 243-8, bibl. 8.

Three common citrus subsoils and corresponding virgin subsoils were placed in pots and were adjusted to a range of pH values from 4–6. Orange seedlings were grown in them with a complete nutrient solution for a 5-month period in each of 2 years. The best growth generally occurred at pH 6, and the poorest growth in pH 4 cultures. No important differences were found between grove and virgin subsoils with respect to growth or nutrient absorption. The Ca and Mg contents of leaves increased as the pH was raised. The concentration of all elements was highest in leaf tissue in cases where the moisture level was controlled.—U.S.D.A., Orlando.

1813. Smith, P. F., and Rasmussen, G. K.
Effects of nitrogen source, subsoil pH and substrate amendments on the growth of orange seedlings.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 262-73, bibl. 16.

The growth of Pineapple orange seedlings in columns of subsoil and sand was reduced by acid-forming sources of N, unless the acidity was counteracted by additive substances or by the soil itself. The development of acidity in the soil was mainly a result of nitrification and occurred mostly in the top layers. In N timing experiments, the development of acidity was the same whether small amounts were applied frequently or larger amounts were applied less frequently. pH determinations showed that acidity from ammonium sulphate moved twice as fast into a limed soil column as did that from ammonium nitrate. Leaf analyses showed that orange seedlings can obtain adequate Mg from dolomite irrespective of the N source, but ammonium ions tended to depress Mg absorption in these tests.—U.S.D.A., Orlando.

1814. Naude, C. J.
Growth and mineral absorption studies with grafted and girdled rough lemon cuttings in nutrient solution.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 62-74, bibl. 10.

Average plant weights of non-grafted lemon plants were higher than those of grafted and of slightly-girdled, non-grafted plants at various stages of development. In grafted and slightly-girdled plants the top: root ratios were greater (though not significantly so) than in non-grafted plants. There were no major differences in concentrations of N, P, K, Ca, Mg, Mn and Fe between the three treatments. It is suggested that the interference in phloem transport by girdling and grafting may explain the slower growth of such trees in the field. Since a bud-union effect resembles girdling it may partly explain the earlier bearing of budded trees.

1815. Wallace, A., and Mueller, R. T.
Further studies concerning girdling and cutting the xylem on absorption and translocation of nitrogen in small citrus trees.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 139-43, bibl. 5.

In rooted lemon cuttings translocation of N^{15} was completely inhibited by xylem severence and somewhat reduced by girdling. Nitrogen absorption was considerably decreased when the plants were kept in the dark for 2 weeks before treatment. At a root temperature of 7° C., which is about 5° C. below the mean minimum soil temperature encountered in southern California, absorption and translocation of N were much reduced.

1816. Wallace, A., and Mueller, R. T.
Influence of dark on the absorption and translocation of N^{15}-tagged nitrogen in small sweet orange seedlings.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 144-5.

No N was translocated to the leaves of seedlings which were kept in the dark after root applications of N^{15} had started. Nitrogen absorption was only slightly affected when plants were kept in the dark for 1 week before and 1 week after treatment. The movement of N^{15} into the stems was not greatly decreased by dark treatment.

1817. Wallace, A., and Bennett, J.
Preliminary study on the effect of an auxin and an antiauxin on ammonium nitrogen toxicity of citrus roots.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 146-9, bibl. 3.

Sweet orange seedlings were grown in sand culture at 2 pH values (4 and 7) and supplied with ammonium and nitrate N at 2 levels (7 and 196 p.p.m.) and with 3 growth substance treatments (the anti-auxin α-1-naphthyl methyl sulphide propionic acid (NMSP), the auxin IAA and nil). With ammonium N supplied at 196 p.p.m. NMSP did not prevent a decrease in root growth at pH4 nor did IAA cause a further decrease. NMSP did, however, decrease the top: root ratio at pH4 and high N. At the high N level, with both nitrate and ammonium N, and at pH7 NMSP increased the top: root ratio, but it decreased this ratio at the low N level.

1818. Mouloulis, T. A., and Wallace, A.
Variability in the nitrogen content of lemon leaves of the same age.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 155-62, bibl. 5.

Nine to 15 properly sampled lemon leaves were calculated to be an adequate amount per sample for diagnostic work of 5% accuracy. Leaves on fruit-bearing and on shaded shoots contained less N than those on other shoots. The presence of growing shoots did not reduce significantly the N contents of adjacent leaves that were less than 6 months old.

1819. Kuykendall, J. R., and Wallace, A.
Influence of leaf urea sprays on leaf burn and on leaf, stem and root yields and nitrogen contents of citrus cuttings.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 162-73, bibl. 5.

Biuret-free urea sprays applied to the leaves of rooted lemon cuttings growing in sand and water cultures resulted in increased N contents in leaves, stems and roots. Urea sprays increased growth when the N supply to the roots was low, but slightly reduced growth when the N supply to the roots was high. The addition of sugar to the sprays reduced both urea absorption and leaf burn. Girdling did not decrease urea absorption but appeared to have some effect in reducing leaf burn at high rates of application.

1820. Labanauskas, C. K., and others.
Nitrogen effects on micronutrients in Valencia leaves.
Calif. Citrogr., 1958, **44**: 66-7.
Micronutrients in Valencias.
Calif. Agric., 1959, **13** (1): 13.

Leaves from Valencia orange trees supplied with ammonium N as nitrate or sulphate contained more Mn than those from control trees or from trees that received calcium nitrate. All 3 sources of N resulted in lower B concentrations. Zn and Fe contents were unaffected by N source. The application of 2 lb. actual N per tree annually from steer manure resulted in less Cu and Mn, and more B in the leaves than did similar amounts of N applied as ammonium nitrate. Leaf N was much lower in manure-treated trees than following ammonium nitrate fertilization.—Univ. Calif., Riverside.

1821. Shannon, L. M., and Wallace, A.
Inorganic composition of leaves of citrus trees grown in sand culture some of which flowered and some of which did not.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 37-42, bibl. 4.

Leaf analysis of non-flowering Eureka lemon trees growing on rough lemon, sour orange, sweet orange, trifoliate orange and grapefruit stocks in sand cultures showed that their P contents were low. After P in the nutrient solution had been increased the lemon trees did flower. Data indicated that Washington Navel orange trees on the same stocks could flower with a lower leaf-P content. Nitrogen deficiency did not reduce flowering in lemons.

1822. Deszyck, E. J., and Koo, R. C. J.
Potash fertilization in a mature Duncan grapefruit orchard.
Proc. Soil Crop Sci. Soc. Fla 1957, 1958, **17**: 302-10, bibl. 10.

Leaves and whole fruits of Duncan grapefruit were analysed following fertilization with various rates of potash since 1939. K contents increased with soil applications of K. In general, the K content of the leaves varied from year to year and decreased with age of leaf. K fertilization resulted in higher acidity, soluble solids, and vitamin C, but also in lower juice percentage and ratio of soluble solids to acid in fruits. There was a positive relationship between K content of spring-cycle leaves and fruit acidity. Fruit size and yields were increased by K fertilization, but the percentage of No. 1 grade fruit was reduced. Pre-harvest drop was also reduced by K.—Citrus Exp. Stat., Lake Alfred.

1823. Leonard, C. D., Stewart, I., and Edwards, G.
Soil application of zinc for citrus on acid sandy soil.
Proc. Fla St. hort. Soc., 1958, 1959, **71**: 99-106, bibl. 14, and *Citrus Ind.*, 1959, **40** (1): 5-7, 17-19, 22, bibl. 14.

Soil applications of Zn fertilizers alone did not substantially increase Zn uptake by orange trees regardless of the method of application, and there were increases of only 10 to 20 p.p.m. Zn in the leaves in some cases with applications of 5 to 10 lb. zinc sulphate per tree. A mixture of zinc sulphate (5 lb.) and calcium chloride (5 lb.) applied in 10 piles each about 1 sq. ft or in 60 smaller piles increased leaf Zn contents to between 115 and 219 p.p.m., compared with 47 p.p.m. in untreated controls. Leaf Zn levels were raised to 300 p.p.m. by the application of this mixture in 5 large piles per tree. A mixture of Zn chelate with soda ash, applied in piles or in a narrow band at rates sufficient to raise the soil pH to about 10 locally, also raised leaf Zn concentrations to very high levels. All broadcast applications of Zn were ineffective.—Fla Citrus Exp. Stat., Lake Alfred.

1824. Brusca, J. N., and Haas, A. R. C.
Zinc effect on citrus, avocado.
Calif. Agric., 1959, **13** (1): 12, illus.

In soil and sand cultures solutions containing minor elements, including zinc at 0·2 p.p.m., prevented the occurrence of mottle-leaf and stimulated the growth of young lemon plants. The growth of lemons did not appear to be retarded by Zn concentrations up to 15 p.p.m. Zinc at 5 to 15 p.p.m. applied as the sulphate improved the green colour of avocado leaves.—Univ. Calif., Riverside.

Citrus—growth phenomena.

(*See also* 1870q, 1871d.)

1825. Mouloulis, T. A.
Effect of control of fruiting on phenological observations in lemon trees.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 3-15, bibl. 14.

Flower and shoot production in young Eureka lemon trees was greatest when all the fruits, flowers and flower buds were removed after each flowering period, and lowest when no flowers or fruits were removed. Flowering and shoot production after normal commercial harvesting were intermediate. There were regular seasonal fluctuations in leaf contents of N and starch, N contents being unaffected by the 3 treatments. There was a significant delay in the spring starch increase in defruited trees. Flowers of the unharvested trees were highest in N, while those of defruited trees had the lowest N content. Nitrogen and P contents of the flowers showed a marked decline as flowering progressed. Mineral nutrients were not translocated from the flowers to the tree before abscission. There were indications that lemon leaves store and supply reserves of materials for new growth and flowering, with the possible exception of N.

1826. Biely, M. I., Wallace, A., and Kimball, M. H.
Some factors influencing feeder-root weights and distribution in citrus.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 16-29, bibl. 14.

Samples of citrus feeder roots collected 6 years after the start of sprinkler irrigation and non-tillage treatments showed an average increase of 50% at all levels down to 5 ft over initial figures for feeder root number and distribution. By contrast, feeder roots decreased by an average of 36% under permanent furrow irrigation, although part of the decrease may be attributed to tree decline. Five months after skeletonization feeder root concentration had decreased by an average of 94%; the decrease was greater at the tree skirts than immediately under the trees. Root growth had recovered one year after skeletonization. Sweet orange rootstocks (with Valencia scions) had more feeder roots and a greater percentage of them in the top foot of soil than sour orange, trifoliate orange or rough lemon (which had the fewest feeder roots). More feeder roots were found in the depressions than in the ridges of furrow irrigation channels.

1827. Wallace, A., Cameron, S. H., and Mueller, R. T.
Influence of severe pruning (skeletonization) on the weight and composition of large skeletal fractions of orange trees.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 30-6, bibl. 8.

Eight months after pruning the dry weights and mineral contents of primary branches, trunk, main root, large roots and intermediate roots of skeletonized Valencia trees were lower than those of non-pruned trees. Nitrogen tended to accumulate in the roots of pruned trees, but P and K decreased throughout the portions of the pruned trees studied. These data suggest that the skeletal portions of Valencia orange trees are subject to nutrient withdrawal and accumulation after severe pruning.

1828. Wallace, A.
Loss in dry weight of leaves between removal from tree and drying.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, p. 29.

Dry weight determinations on detached Valencia orange leaves indicated a 2% loss by respiration after standing for one day, and a 6% loss after one week, after which leaves became air dry.

1829. Pogrebnjak, O. I.
Chlorophyll accumulation in the leaves of citrus grown in trenches and glasshouses. [Ukrainian, with Russian summary.]
Nauk. zap. Černivec'k. Un-t, 1956, **23**: 122-6, from *Ref. Ž. (Biol.)*, 1958, No. 1, Abstr. 1,132.

Monthly colorimetric determinations of chloro phyll were made on leaves of 5-year-old orange and of 2 lemon varieties grafted on *Ponciru trifoliata*. Plants grown in trenches grew better and had a higher chlorophyll content than plants grown in pots in a glasshouse, in spite of being kept in the dark for 3 months during the winter. Two soi applications of solutions of $KMnO_4$ and borax (0·5 mg./kg.) increased the chlorophyll content in the leaves of lemons grown under glass.

1830. Minessy, F. A.
Inducing chlorophyll formation in albino citrus seedlings.
Nature, 1959, **183**: 553, bibl. 3.

Albino seedlings of sweet lime were grafted onto normal seedlings. None of the green seedling subsequently showed chlorophyll irregularities and, when the buds on the albino stems were forced to grow, they produced shoots with normal green leaves which remained green even after the green and albino seedlings were separated.—Univ Alexandria, Egypt.

1831. Babenko, V. I.
Initiation and differentiation of fruit buds on lemons in trenches and lemon [unheated glass houses. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur 1956, No. 1, pp. 113-26, from *Ref. Ž. (Biol.)* 1958, No. 4, Abstr. 15,821.

Work at Odessa and in the Ukrainian Institute of Viticulture has shown that fruit bud initiation in lemons, that were covered during the winter begins after emergence from enforced physiologica dormancy in April. With an increase in the amount of glass used in the covers the onset of temperatures high enough to encourage growth is hastened. Light conditions during the winter have no effect on the time of fruit bud initiation, the earliest example of which was found in the Chinese [Meyer] lemon. Once they have formed the frui buds of lemons do not have a dormant period.

1832. Krezdorn, A. H., and Robinson, F. A.
Unfruitfulness in the Orlando tangelo.
Proc. Fla St. hort. Soc., 1958, 1959, **71** 86-91, bibl. 9, and *Citrus Ind.*, 1958, **39** (12) 20, 22, 24-5, bibl. 9.

Orlando tangelo was shown to be weakly parthenocarpic and self-incompatible. Cross-pollinations resulted in a large increase in fruiting in comparison with self-pollinated control trees. Temple was the outstanding pollinator for Orlando trees.— Fla agric. Exp. Stats, Lake Alfred and Gainesville

1833. Crocker, A. J.
Fruit drop can be prevented.
Qd agric. J., 1958, **84**: 629-32, illus.

Pre-harvest drop of Ellendale mandarins may be controlled by spraying 2,4-D, 22 p.p.m., at about gal. per tree, about 2 days before the expected op, normally in late June.

Citrus—diseases and pests.

(*See also* 1288, 1303, 1870h, s, t.)

34. KLOTZ, L. J., AND DEWOLFE, T. A.
Twig die back of citrus.
Calif. Citrogr., 1959, **44**: 99-100, bibl. 6.

me causes, both physiological and pathological, twig die back are discussed. Fungicides applied the hope of limiting twig injury were found to crease it. The maintenance of optimum soil oisture levels appears to be one of the main ways reducing the incidence of die back.

35. (DESJARDINS, P. R.)
New equipment to aid attack on viruses.
Calif. Citrogr., 1959, **44**: 81.

heat treatment chamber has been set up in lifornia capable of keeping young citrus plants temperatures of 100°–104° F. Growth is celerated in plants kept for 6 weeks to 3 months these temperatures with regulated artificial light, new growth is largely free of certain viruses. results or details of the equipment are given in s note.

36. REICHERT, I.
Citrus virus diseases in the Mediterranean and the New World.
FAO Plant Prot. Bull., 1958, **6**: 180-3, bibl. 23.

has been found that xyloporosis is more widely read in the Mediterranean region than had been ught, and that it attacks trees grafted on sour nge as well as those on sweet lime. The disease also widespread in Florida. It is now thought stubborn disease in Arizona and California ay be identical with xyloporosis.

37. KLOTZ, L. J., DEWOLFE, T. A., AND WONG, P.-P.
Influence of 2 varieties of citrus scions on the pathogenicity of 3 isolates of *Phytophthora parasitica* to sweet orange rootstock.
Phytopathology, 1958, **48**: 520-1.

adam Vinous sweet orange rootstocks bearing sbon lemon tops were significantly less resistant *Phytophthora parasitica* than those bearing ashington Navel orange tops. Further investiga- ons are in progress on possible effects of the ions on the bark composition of the rootstocks.

38. ATKINS, E. L., Jr.
The citrus cutworm *Xylomyges curialis* Grote: economics, biology, and control.
J. econ. Ent., 1958, **51**: 653-7, bibl. 10, illus.

is cutworm was first recorded as an economic st of citrus in 1935 in central California. Injury nsists of larval feeding on spring growth and on wly set, ripening or ripe fruit. The larvae are difficult to find on the trees, but if 10 or more are found on a per-hour-search basis, or 10 or more per tree are found after a test spray with DDT, treatment is desirable. In experiments 9 insecticides used alone or in combination were compared. Recommendations based on these trials are to use any one of the following: DDT or TDE (DDD) actual ingredient at 5 lb./ac.; toxaphene at 6 lb./ac.; and parathion at 2 lb./ac.—Univ. Calif., Riverside.

1839. GAMERO DE LA TORRE, O.
Trabajos de control de las moscas de la fruta *Ceratitis capitata* Wied y *Anastrepha striata* Schin. (Trypetidae). **(Control measures against the fruit flies *Ceratitis capitata* and *Anastrepha striata* (Trypetidae).)**
Rev. peru. Ent. agríc., 1958, **1**: 60-6, bibl. 10.

Fruit drop in citrus orchards was reduced by 80% when fruit flies, predominantly *Anastrepha striata*, were controlled by 4 sprays, at 20-day intervals, of a mixture of 83 c.c. of 50% Dipterex E, 5 l. of molasses, 470 g. of yeast and 50 gal. of water, applied to 1 row of trees in every 5. The use of protein baits in the U.S.A., Hawaii and Mexico is reviewed.

1840. WILLE, J. E.
La mosca mediterránea, *Ceratitis capitata* Wied, en el Perú. **(The Mediterranean fruit fly, *Ceratitis capitata,* in Peru.)**
Rev. peru. Ent. agríc., 1958, **1**: 59-60.

The pest's first appearance in Peru was in a citrus orchard in Huánuco in 1956, since when it has fortunately not spread rapidly nor caused serious losses. Control measures with protein baits mixed with parathion are proposed for this pest as well as for the much commoner *Anastrepha striata*.

1841. PUZZI, D., AND ORLANDO, A.
Progress on fruit fly control in São Paulo, Brazil.
FAO Plant Prot. Bull., 1958, **6**: 184-8, bibl. 11, illus.

Ceratitis capitata is the main species found in coffee plantations and *Anastrepha mombinpraeoptans* in fruit orchards. The development of poison bait spraying is discussed. Protein hydrolysates are used for this purpose, and, among these, hydrolysate of concentrated corn steep liquor is cheap and effective [see also *H.A.*, 28: 1282]. For mixing with the bait spray, dieldrin at 0·1%, malathion at 0·2% and parathion at 0·02% have given good results. In citrus and peach orchards over 1 ha. in area 250 l. per ha. is applied to one side only of the trees at intervals of 2 weeks or less. In one orchard of 10 ha. 97% control was obtained, but in orchards smaller than 1 ha. invasion from outside renders the treatment less satisfactory. Soil treatment to control pupae and emerging adults is an important auxiliary method of control. Preliminary tests showed that aldrin, at 9·5 g. of a

2·5% powder on 1 sq. m. of soil, killed all pupae and emerging adults and had a great residual effect. Chlordane was less effective.

1842. Georgala, M. B.
Fruit fly control experiments with bait sprays containing protein attractants.
Citrus Gr, 1958, No. 299, pp. 1-15, bibl. 3.

Several baits were tested with malathion 25% wettable powder for use against *Ceratitis capitata* and *Pterandrus rosa*. Staley's Sauce No. 7 (a hydrolysed vegetable protein) was suitable for both species under South African conditions [see also *H.A.*, 29: 820]. The bait was most attractive to the flies 4–6 hours after application, and on the second day there was a marked drop in attraction. Concentrations of 1½ pints per 100 gal. and over were most effective, and with 2 pints/100 gal. attraction continued with decreasing intensity for about a week. The attraction of Staley's Sauce was reduced by rain and also by cool weather; thus during the winter the concentration should be raised to 2½ pints. Malathion 25% w.p. was effective when used in combination with Staley's Sauce baits, and at 2 lb./100 gal. gave good control of both fly species. The residual toxicity of malathion at 2 lb. matched that of 4 pints of Staley's Sauce. Sugar baits lacked the initial impact of Staley's Sauce, but when applied with Staley's Sauce the attraction on the second day after application was improved. Pilchard meal had an immediate attractant effect similar to equivalent rates of Staley's Sauce, but its residual effect was less. Recommendations are made on bait mixtures, frequency of baiting and methods of bait application, and the cost of materials is indicated.—S.A. Co-op. Citrus Exchange Ltd.

1843. Georghiou, G. P.
Controlling the Mediterranean fruit fly.
Countryman, Nicosia, July/Aug. 1958, p. 26.

Fly traps containing a 1 in 30 solution of Clensel should be installed, at the rate of 1 per donum, in September. When 2 to 3 flies are found per trap, spraying with dieldrin should be done, covering the tops and south sides of trees only, so as to preserve a proportion of the slow-moving beneficial insects.

1844. Simanton, W. A.
Studies of Mediterranean fruit fly lures in Florida.
J. econ. Ent., 1958, **51**: 679-82, bibl. 4, illus.

Angelica seed oil, which is considered the best lure for *Ceratitis capitata*, is in short supply. Two synthetic esters of 6 methyl cyclo hexene carboxylic acid, the secondary butyl ester (ENT 21486, now named siglure) and the isopropyl ester (ENT 21478), were adopted as supplemental lures. Studies on the volatilization of these led to modification of vaporizers and dosages for a trap [see *H.A.*, 28: 1281] that greatly improved field trapping operations. [From author's abstract.]—Univ. Fla Citrus Exp. Stat., Lake Alfred.

1845. Jeppson, L. R., Jesser, M. J., and Complin, J. O.
Factors affecting populations of the citrus bud mite in southern California lemon orchards and acaricide treatments for control of this eriophyid.
J. econ. Ent., 1958, **51**: 657-62, bibl. 4.

The work reported was carried out over a period o 2 to 5 years in treated and untreated plots in 4 orchards. In untreated plots a rapid increase in infestation in lemon buds started in May or June, reaching a peak in August or September. Population levels, whether remaining high or declining during the winter, fell to an annual low during April and May. Warm summer weather favourable for plant growth and mite dispersal resulted in a rapid increase in infestation, whereas winter conditions appeared to reduce movement from one bu to another. Periods of low humidity during the winter or spring appeared to cause a decline i infestation within the buds. An unusually ho spell in September 1955 resulted in a sharp decreas of infestation especially in the orchard farthes from the coast. The summer population increas was about 1 month later under fruit buttons tha in the buds, but populations under buttons wer higher than in the buds most of the year. Applica tions of petroleum oil and of Aramite in bot autumn and spring were necessary for adequat control. Chlorobenzilate was most effective whe applied between 1 June and 30 September, when a single application kept mite populations low for a whole year. [From authors' abstract.]—Univ Calif., Riverside.

1846. Birchfield, W., and others.
Sampling "pulled and treated" areas for th burrowing nema *Radopholus similis* (Cobb Thorne.
Plant Dis. Reptr, 1959, **43**: 41-6, bibl. 17.

No burrowing nematodes were recovered fron "pulled and treated" areas where no citrus sprout had been left and where clean fallowing had bee practised for at least 6 months.—St. Plant Bd Fla

1847. Reynolds, H. W., and O'Bannon, J. H.
The citrus nematode and its control on livin citrus in Arizona.
Plant Dis. Reptr, 1958, **42**: 1288-92, illus

Emulsifiable formulations of 1,2 dibromo-3-chloro propane (DBCP) applied at 2 to 10 gal./acre i irrigation water to grapefruit on sour orange gav excellent control of citrus nematode (*Tylenchulu semipenetrans*). Hedging and/or ordinary prunin combined with the soil treatment resulted in a mor rapid tree recovery. Of 2 methods of applicatio tried, using a constant-head vessel for metering th chemical through a centrifugal pump was the more satisfactory.—U.S.D.A. and Ariz. agric. Exp. Stat., Tempe.

1848. N.S.W. Department of Agriculture, Entomological Branch.
Red scale and yellow scale.
Agric. Gaz. N.S.W., 1958, **69**: 487-90, illus.

The life-histories and damage caused to citrus trees by *Aonidiella aurantii* and *A. citrina* are described. Fumigation with HCN gas under covers is the best control method. Spraying with white oil, 1 in 40 parts of water, is also effective but can reduce blossoming and delay fruit coloration if applied too late in the season. A combination of 1 gal. white oil+4 lb. of 25% malathion w.p. in 100 gal. water is a satisfactory substitute for full strength white oil.

1849. Tomita, E., and Ōgaki, C.
The effect of the new acaricides and organic insecticides on the injurious insects of Satsuma orange. [Japanese, with English summaries 19 and 16 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 24-30.

Trials showed that EPN emulsion applied between late May and mid-June controlled Yanone scale more effectively than parathion or lime-sulphur and zinc sulphate. Tedion proved a good persistent acaricide for control of the citrus red mite but was not very effective against the scale. J.R.L.

1850. Jenkins, C. F. H.
The citrus white fly.
J. Agric. W. Aust., 1958, **7**: 584-5.

An introduced species of white fly is causing some concern in Western Australia. A recommended spray is composed of 2 gal. white oil plus 1¼ pints black leaf 40 or 50% malathion in 100 gal. water. A second spraying 2–3 weeks later, but using only about 1 gal. white oil, may be necessary.

1851. Gunther, F. A., and others.
Residual behavior of *S*-(*p*-chlorophenylthio) methyl *O,O*-diethyl phosphorodithioate (Trithion) on and in mature lemons and oranges,
J. agric. Food Chem., 1959, **7**: 28-30, bibl. 5.

Residues were determined by two analytical procedures. The apparent magnitudes and the residual behaviour of these residues as determined by a non-specific total-chloride method differed from those determined by the more specific colorimetric procedure. However, the magnitudes and persistence of Trithion residues determined by both methods are in general agreement with those of most other insecticides and acaricides on citrus fruits. [From authors' abstract.]—Univ. Calif., Riverside, and Stauffer chem. Co., Richmond, Calif.

Citrus—fruit handling and marketing.

(*See also* 1870d, e.)

1852. Grierson, W., and Hayward, F. W.
Hydrocooling studies with Florida citrus.
Proc. Fla St. hort. Soc., 1958, 1959, **71**: 205-15, bibl. 15, illus., and *Citrus Ind.*, 1958, **39** (12): 5-7, 11-12, 14-19, bibl. 15.

In hydrocooled Hamlin oranges both decay and peel injury were higher than in uncooled oranges. The addition of Dowicide A in the hydrocooler water decreased decay for 17 days, but caused a further slight increase in peel injury with Hamlin oranges. Peel injury increased to a serious level after "Dowicooling" of Pineapple oranges. It was shown that water wax (Lake Alfred Wax 101A) can withstand hydrocooling, and can be applied before or after hydrocooling. With Valencia oranges hydrocooling followed by cool temperatures in transit resulted in good decay control for up to 10 days; peel injury was slightly increased by hydrocooling. "Dowicooling" sharply reduced decay but almost doubled peel injury. Valencias packed in mesh bags or in polythene bags after hydrocooling showed low initial decay incidence, but after 17 days decay in polythene bags was significantly higher than with non-hydrocooled fruits in mesh bags. Hydrocooling of grapefruit in cartons was not very successful.—Fla Citrus Exp. Stat., Lake Alfred.

1853. Hopkins, E. F., and McCornack, A. A.
Experiments with a non-buffing fungicidal wax for decay control in oranges.
Citrus Mag., 1959, **21**(5): 22, 24, 26-7, bibl. 8.

A fungicidal citrus wax (PF-1) was prepared by combining sodium *o*-phenylphenate (Dowicide A), hexamine and sodium hydroxide with a commercial, self-polishing water-wax emulsion. In trials with oranges, PF-1 showed excellent decay control in fruit kept at 60° F. or 70° F. and also in fruit held in cold storage.

1854. Yukawa, I., and Takahashi, K.
Experiments on coating Satsuma oranges with water wax. (3) The effects of coating with wax on transpiration and rail roading of stored fruits. [Japanese, with English summary 10 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1958, No. 6, pp. 20-3, illus.

The following results are given: 1. The loss in weight of waxed oranges was less than that of unwaxed fruit. 2. Waxing did not prevent the fruit rotting; in fact more waxed than unwaxed fruit rotted. 3. Stored fruit which was waxed before shipment changed in colour and taste, and chemical analysis showed that there was also a considerable loss of sugar. [See also *H.A.*, 28: 1823.]

1855. Erickson, L. C., DeWolfe, T. A., and Brannaman, B. L.
Growth of some citrus fruit pathogens as affected by 2,4-D and 2,4,5-T.
Bot. Gaz., 1958, **120**: 31-6, bibl. 18.

The plant growth-regulators 2,4-D and 2,4,5-T were tested *in vitro* on 9 species of citrus-fruit pathogens to determine the degree of inhibition of growth by concentrations of from 5×10^{-6} *M* to 5×10^{-3} *M*. The species tested were *Alternaria citri*, *Botrytis cinerea*, *Diaporthe citri*, *Diplodia natalensis*, *Oöspora citri-aurantii*, *Penicillium digitatum*, *P. italicum*, *Sclerotinia sclerotiorum* and *Trichoderma lignorum*. The highest concentration of both growth regulators significantly retarded growth in all species except *P. italicum*. In no species, however, was growth completely inhibited, nor was there any instance of a significant stimulation at lower concentrations. The degree of toxicity exhibited by 2,4-D and 2,4,5-T toward the fungi appears to be entirely inadequate to explain the control of *Alternaria* rot of stored lemons in southern California or of *Diplodia* rot of oranges in South Africa. [From authors' summary.]—Univ. Calif., Riverside.

1856. Eaks, I. L.
Atmosphere in unvented cartons of Valencias.
Calif. Citrogr., 1958, **44**: 65-6, bibl. 2.

The atmosphere in unventilated cartons of Valencias showed only slight variations in O_2 and CO_2 contents from those found in air after precooling and a simulated transit period, and also during storage at 10° C. and 20° C.

1857. Harvey, E. M., and Atrops, E. P.
Shipping tests with California citrus fruit from Los Angeles to Rotterdam.
Mktg Res. Rep. U.S. Dep. Agric. **219**, 1958, pp. 26, illus.

Observations on 6 shipments of oranges, lemons and grapefruit from Los Angeles to Rotterdam indicate that more care should be taken in selecting top quality fruit for overseas shipment and in avoiding bruising. Storage patterns and ventilation in ships' holds should be modified if fibre cartons are used, and it is desirable to pre-cool the fruit thoroughly before loading.

Dates.

1858. Wertheimer, M.
Un des principaux parasites du palmier-dattier algérien, le *Myelois decolor*. (***Myelois decolor*, one of the chief pests of the date palm in Algeria.**)
Fruits d'Outre Mer, 1958, **13**: 309-23, illus.

The life history and damage caused by this moth, the larvae and pupae of which are found in the ripe fruit and render it unsaleable, are fully discussed. Good control is obtained by dusting with BHC (lindane) or DTT 10% (Magirol) at about 200 g. per palm in 3 treatments. The choice of dates on which to apply the insecticide is somewhat critical. It may be applied by a hand- or motor-duster, using a lance 6–8 m. in length.

Olives.

(*See also* 1231a, 1870c, g, v, w.)

1859. de la Rocha [G.], G.
Propagación vegetativa del olivo 1957. (**Vegetative propagation of olives, 1957.**)
Inf. mens. La Molina, 1958, **32** (370): 18-21.

Scions, mainly of the variety Ascolana, were grafted on Liguria rootstocks. In a greenhouse experiment, the percentage of success and the quality of the resulting plants were distinctly higher with whip and tongue than with cleft grafting. In a nursery experiment comparing 8 methods, perfect unions and excellent growth were obtained by flute (tubular patch) budding, with 77% "takes". Veneer grafting with 70%, and whip and tongue with 47%, successes, also gave good plants. The highest percentage (90) of "takes" was from shield budding, in which removal of the wood was an advantage, but the above methods gave better plants. Crown grafting was the least successful, with only 33% "takes".

1860. García Fernández, J.
Plantación de olivares. (**Planting olive groves.**)
Bol. Oleic. int., 1958, **8** (43): 3-10, bibl. 3, illus.

The period of 20 years usually required before olive trees become fully productive can be reduced to 12–14 years by deep ploughing before planting, combined with deep placement of P and K fertilizers. Leguminous cover crops are beneficial in the early years. In some parts of Spain, cuttings are planted direct, by pushing straight branches several years old into the soil and earthing them up in cone-shaped mounds of soil.

1861. Breviglieri, N.
La coltura intensiva dell'olivo secondo i nuovi sistemi di allevamento. (**Intensive cultivation of olives under the new system of training.**)
Ital. agric., 1959, **96**: 36-43, bibl. 1, illus.

Olive trees in Italy, trained on the free palmette system, with inclined branches, and grown in rows resembling hedges, have given excellent yields as early as the third year. Very little pruning is needed, harvesting is facilitated, and treatment with insecticides or fungicides greatly simplified; hence maintenance costs are low compared with those for other systems. Recent work done in California on dwarfing rootstocks for this type of olive training and on mechanized pruning of citrus trees to convert rows into "hedges" is briefly summarized. [See also *H.A.*, 29: 849.]

1862. Hartmann, H. T.
Nitrogen fertilizers on olive.
Calif. Agric., 1958, **12** (12): 6-7, 10.

In a trial with the Mission variety on a gravelly, sandy loam, increased N was associated with greater fruit set, but N level did not affect inflorescence production, inflorescence length, number of flowers per inflorescence or the percentage of perfect flowers. Increased amounts of N were associated with delayed fruit maturity, but the oil content of the fruit was not affected by N level. A further trial in the same orchard was undertaken to study the effects of soil N on yields and fruit sizes. Leaf N and yields increased in general as the amount of N applied in February increased. Fruit size was inversely proportional to the amount of N applied, with the largest fruit produced by unfertilized trees. A third experiment was carried out in an orchard of Sevillano trees, about 35 years old, on a clay loam. Response to differential N treatments was not marked, the N status of untreated trees being adequate. Fruit size was generally larger in unfertilized trees. It is concluded that the response to N fertilizers is likely to be rapid and pronounced when the leaf N content is 1·2% or less.

1863. Lozzia, G.
Essais de traitement de la cochenille noire de l'olivier et la fumagine dans les oliveraies du Maroc oriental. **(Experiments on the treatment of black scale and sooty mould in olive groves of eastern Morocco.)**
Inf. oléic. int., Jan./Mar. 1958, pp. 29-32.

Experiments showed that black scale (*Saissetia oleae*) could be controlled by a single treatment of the olive trees at the time of hatching (August in eastern Morocco) with 2·5% white oil. Sooty mould was eradicated by one treatment with 1% bordeaux mixture, with the addition of 0·7% wettable sulphur except when air temperatures were high, when leaf scorching was a danger. The improvement in yield and quality of olives justified the cost of the treatments.

1864. Levi, N.
Le stockage des olives en huilerie. **(The storage of olives at oil factories.)**
From abstr. in *Inf. oléic. int.*, Jan./Mar. 1958, pp. 33-4.

Brief notes are given on olive storage in silos, in a thin layer, in superimposed perforated trays, in perforated tanks, in air-tight vats with or without gas, in air-cooled perforated boxes, in refrigerators, and by drying. In Tunis investigations are in progress on storage in continuously aerated and purified water, and on storage of the crushed fruit with the aid of anti-oxidants.

1865. Baudrillart, P.
Note sur des essais de stockage de longue durée d'olives destinées à l'huilerie. **(Note on long-term storage trials with olives intended for oil extraction.)**
From abstr. in *Inf. oléic. int.*, Jan./Mar. 1958, pp. 35-6.

Storage in silos, with or without the addition of salt or other preservatives, gave very poor results. Storage in a raised steel vat (¼ full) for 10 months was also unsatisfactory, but the same quantity of olives, crushed with 10% of their weight of salt and stored in an identical vat, gave a good yield of high quality oil.

1866. Bonnet, P.
Le stockage à l'eau des olives d'huilerie. **(Storage of oil-producing olives in water.)**
From abstr. in *Inf. oléic. int.*, Jan./Mar. 1958, p. 39.

Olives were stored in south-eastern France for 2 months in vats, with a constant flow of fresh water entering at the base at 3 l. per min. per 10 tons of fruit. The yield and quality of the oil were as high as from fresh olives. There was neither fermentation nor growth of moulds during storage.

Passion fruit.

See 1870b.

Persimmons.

(*See also* 1805, 1870j.)

1867. Kumashiro, K., Fukuda, S., and Harada, Y.
Studies on the rootstocks of Japanese persimmons. 3. Growth of rootstocks as affected by soil reactions. [Japanese, with English summary 10 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 47-9, bibl. 3.

Optimum growth occurred in rootstocks of *Diospyros kaki*, *D. lotus*, and *D. kuroiwai* at pH 6·0–6·8 and in stocks of *D. virginiana* at pH 5·0–7·6.

1868. Fukuda, S., and Iba, Y.
Growth of young fruit trees as affected by different soil properties, II. [Japanese, with English summary 20 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 64-8, bibl. 9.

In pot experiments with young plants, grown in 4 soils, namely clay loam, loam, sandy loam and sandy soil, new shoot growth and total weight were most encouraged in vines by loam (with a low level of applied N) and by sandy soil (with a higher N level), in Japanese persimmons by sandy loam, and in figs and Unshiu oranges by sandy soil. In all cases root growth was greatest in the sandy soil.

1869. Ten'kovceva, Ė. S.
The biology of pollination in Japanese persimmon. [Russian.]
Bjul. Vses. n-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 4, pp. 81-96, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,842.

At Suhumi a study was made on the capacity of persimmons to fruit parthenocarpically and on the effect of pollination. Of 8 varieties studied 5 were self-sterile and the yield of the other 3 was also increased by pollination. In parthenocarpic varieties pollination with citrus pollen or sterilized soil dust increased the percentage of fruit set, all the fruit remaining seedless. To obtain stable yields of good quality fruit, however, persimmon plantations should include some varieties selected as pollinators.

Tung.

See 1024.

Noted.

1870.

a Aiyappa, K. M., Nanjappa, P. P., and Subramanian, C. K.
"Coorg lime"—a new variety.
Mysore agric. J., 1958, **33**: 91-2.
A high yielding, thornless variety briefly described.

b Avent, K. L.
Berry fruit growing in Victoria. 3. Passion fruit.
J. Agric. Vict., 1958, **56**: 637-49, illus.
Full details of establishment and maintenance.

c Bamonte, A.
L'oliva Ascolana. (**The olive variety Ascolana.**)
Ital. agric., 1958, **95**: 851-77, bibl. 75, illus.
Mainly historical.

d Blinc, M.
Conservation process of citrus fruits.
Bull. sci. Cons. Acad. RPF, Belgrade, 1958, **4**: 39.
Of 4 treatments tried a diphenyl dip was the best for preventing spoilage and weight loss.

e Cameron, A. E.
Bulk handling.
Citrus News, 1958, **35**: 75.
Of citrus fruit just starting in Australia.

f (Carpenter, J. B., and Furr, J. R.)
Citrus research at USDA Date Station.
Calif. Citrogr., 1958, **44**: 53-4.
On new rootstocks resistant to gummosis and on breeding varieties for desert areas.

g Caumel, E.
L'étude de la fumure des oliveraies irriguées. (**A study on the manuring of irrigated olives.**)
Fruits et Prim., 1958, **28**: 113-14.
Preliminary results showed a positive correlation between yield and leaf K.

h DeBach, P.
The role of weather and entomophagous species in the natural control of insect populations.
J. econ. Ent., 1958, **51**: 474-84, bibl. 17.
A review, with special reference to California red scale (*Aonidiella aurantii*) control on citrus.

i Desjardins, P. R.
Callus tissue growth on avocado stem segments cultured on artificial media.
Yearb. Calif. Avoc. Soc. for 1958, pp. 99-101, bibl. 8, illus.
Development of technique for culture *in vitro*.

j Forte, V.
Il kaki: specie frutticola al tramonto? (**The persimmon: a fruit passing out of favour?**)
Frutticoltura, 1958, **20**: 657-63, illus.
Growing, storage and possibilities of extending export from Italy.

k Freistadt, D.
Harvesting avocados.
Yearb. Calif. Avoc. Soc. for 1958, pp. 39-40.
Determinations of oil content used as a guide to selective picking.

l Georges-Lévi, F.
Les applications du diagnostic foliare aux agrumes. (**The application of foliar diagnosis to citrus.**)
Fruits d'Outre Mer, 1958, **13**: 387-94, bibl. 23.
A review, including sections on standards, interactions between elements and the practical application of results.

m Gilpatrick, J. D., and Zentmyer, G. A.
Chemical soil treatments for the control of root rot of avocado.
Yearb. Calif. Avoc. Soc. for 1958, pp. 41-3.
A progress report on trials with Vapam, DD and Telone, chloropicrin and methyl bromide [see also *H.A.*, 28: 2952].

n Godfrey, G. H.
Avoiding some hazards in banking trees.
Citrus Mag., 1958, **21** (4): 19.
For frost protection.

o HARDING, P. L.
Factors affecting quality in citrus fruits.
Citrus Ind., 1958, **39** (11): 10-12, bibl. 7.
Citrus Mag., 1958, **21** (4): 14-15, 22, 24, bibl. 7.
Studies on ascorbic acid, total solids and juice percentages reviewed.

p IWASA, S., AND SHIRAISHI, S.
Studies on the trifoliate orange. 1. Strains found in *Poncirus trifoliata* Raf. [Japanese, with English summary 21 lines.]
Stud. Inst. Hort. Kyoto, 1957, **8**: 59-63, bibl. 5, illus.
Seedlings divided into 3 strains, Ôba (large-leafed), Chûba (ordinary leafed) and Koba (dwarf form).

q LOUSTAU, J., ORTUÑO, A., AND CARPENA, O.
La estructura de los cloroplastidios de hojas de *Citrus*. 1. Limonero. (**Chloroplast structure in citrus leaves. 1. Lemon.**) [English summary 8 lines.]
An. Edafol. Fisiol. veg., 1958, **17**: 473-85, bibl. 3, illus.
A preliminary step in a programme of cytological, physiological and biochemical studies.

r MARSH, A. W.
Irrigation practices and problems.
Calif. Citrogr., 1958, **44**: 44, 54-9, bibl. 5.
Five practical problems discussed.

s MAY, A. W. S.
Fruit fly control in citrus orchards.
Qd agric. J., 1958, **84**: 561-6, illus.
Symptoms of, and factors influencing, damage by *Strumeta tryoni* and *S. humeralis*; 0·2% DDT sprays for control.

t NOUR-ELDIN, F., AND BISHAY, F.
Presence of the tristeza virus disease in Egypt.
FAO Plant Prot. Bull., 1958, **6**: 153-4, bibl. 3, illus.
Found on an experiment station but thought to be absent from commercial plantings.

u RICHARDS, S. J., AND OTHERS.
Avocado irrigation and nitrogen fertilization plots at the Citrus Experiment Station.
Yearb. Calif. Avoc. Soc. for 1958, pp. 25-9, illus.
A condensation of results reported in *H.A.*, 29: 775-780.

v RISUEÑO, A.
Extracción continua del aceite de oliva. (**Continuous extraction of olive oil.**)
Bol. Oleic. int., 1958, **8** (44): 5-13, illus.
A press with a mobile filtering surface described.

w SOLTERRA, CONDE DE.
Una gran riqueza recuperada. Magnifico horizonte para la olivicultura tarraconense. (**A major source of wealth reclaimed. Excellent prospect for olive growing in Tarragona.**)
Rev. Inst. agríc. catal., 1958, **107**: 160-2.
A brief review of olive-fly control, culminating in spectacular results with diazinon.

x STANLEY, W. L., LINDWALL, R. C., AND VANNIER, S. H.
Specific quantitative colorimetric method of analysis for citral in lemon oil.
J. agric. Food Chem., 1958, **6**: 858-60, bibl. 8.
Specific for citral in presence of other aldehydes and ketones.

y UMALI, D. L., AND BERNARDO, F. A.
Notes on mutant forms among Philippine plants. I. A case of green santol (*Sandoricum koetjape* Merr.). II. Seedless avocado (*Persea americana* Mill.).
Philipp. Agric., 1958, **42**: 141, bibl. 1, illus., and 194-5, illus.

z WALLACE, A.
Citrus rootlet respiration rates as a possible factor in differential cation uptake.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 59-61, bibl. 7.
Unlikely to explain the effect of different rootstocks on cation uptake.

1871.

a WALLACE, A.
Number of lemon fruits required for adequate assay sample for citric acid content.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 43-5, bibl. 2.
At least 100 fruits must be sampled.

b WALLACE, A.
Variation in the critical level of magnesium in citrus leaves.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, p. 45.
Critical Mg levels for oranges in California are lower than those in Florida.

c WALLACE, A., AND BEDRI, A. A.
Urea and other substances in iron and zinc foliage sprays.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 174-8.
See *H.A.*, 28: 2950 for a shorter account of this work.

d WALLACE, A., AND NAURIYAL, J. P.
Some growth habits of Valencia orange trees.
Spec. Rep. Univ. Calif., Los Angeles, 1958, No. 1, pp. 46-56, bibl. 58.
Data reported in the literature reviewed.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1348, 1349, 1351, 1352, 1983v, 1997, 2000, 2001, 2003, 2004, 2008, 2010, 2015, 2016, 2018k-m.)

1872. Guillaume, M.
Économie rurale de l'Océanie française. Esquisse de développement agricole. (**Rural economy of French Oceania. An outline of agricultural development.**) [English and Spanish summaries ⅔ p. each.]
Agron. trop., 1958, **13**: 279-99, 448-57, 558-629, illus.

After describing the geography, economy and agricultural background, the need for agricultural development to improve the standard of living is emphasized. Detailed plans are outlined for, amongst other projects, the rehabilitation of the coconut industry, the improvement of vanilla production and the development of coffee, black pepper and citrus growing in order to diversify production.

1873. Popenoe, W.
Un programa para incrementar la producción de buenas frutas en la República de El Salvador. (**A plan for increasing production of good quality fruits in the Republic of El Salvador.**)
Ceiba, 1958, **7** (1): 44-61, illus.

The existing varieties are reviewed and recommendations are made for improving these and introducing others. The fruits concerned are citrus, mango, avocado, pineapple, cherimoya and other species of *Annona*, guava, sapodilla (*Achras sapota*), star apple (*Chrysophyllum cainito*), persimmon, grape, peach, plum, apple, pear, loquat, strawberry and blackberry. As rootstocks for *Annona* spp., *A. reticulata* is recommended for use and *A. purpurea* suggested for trial.

1874. Hartley, R. L.
The Koronivia Farm Institute.
Bull. Dep. Agric. Fiji **33**, 1958, pp. 34, illus.

A two-year course in general and tropical agriculture is given at the Institute, which is located at the Principal Agricultural Station, Koronivia. Information is given on the training provided for the students since the Institute opened 4 years ago.

1875. Bureau des Engrais et la Division d'Agrologie, I.N.É.A.C.
Techniques de prélèvements en vue du diagnostic chimique du besoin en engrais. (**Sampling techniques with a view to chemical diagnosis of fertilizer needs.**)
Bull. Inf. I.N.É.A.C., 1958, **7**: 273-302, illus.

Precise and well-illustrated directions are given on taking leaf samples for chemical examination of coffee, oil palms, cacao, citrus, tea and rubber. Advice is also given on taking soil samples. A form of questionnaire is appended which should elicit the necessary background information regarding the plantation from which the samples are taken. Two examples are given of the results obtained and their interpretation from samples taken from coffee plantations.

Bananas.

(*See also* 1349, 1982h, 1983f.)

1876. Bridger, G. A.
The production and marketing of bananas in the Federation.
Rhod. agric. J., 1958, **55**: 511-28.

The economics of banana growing in Rhodesia and Nyasaland are considered in some detail, and it is concluded that the crop can be profitably expanded in the more suitable, frost-free areas. Data are also given on the nutritive value of bananas.

1877. Osborne, R. E.
Breeding the immune banana.
Occas. Bull. Jamaica Banana Bd Res. Dep. **2**, 1958, pp. 8, bibl. 4, illus.

A banana breeding programme, aimed at producing a substitute for Gros Michel that would be immune to Panama disease, was started in Jamaica in 1924. This bulletin gives an outline of the history and organization of this programme, the breeding techniques used and some of the problems involved, and the results obtained to date. So far the desired substitute for Gros Michel has not materialized, but the quality of the seedlings produced has improved over the years and a few selections are now undergoing trials in comparison with the variety Lacatan.

1878. Anon.
Banana planting in Israel.
Fm Mechaniz., 1958, **10**: 426, illus.

A brief description is given of a banana planting machine developed in Israel. The planter carries 60–75 suckers and plants these in about 3 minutes. With a spacing of 9×6 ft an average rate of 1 acre per hour can be attained.

1879. Bidner-BarHava, N., and Ravikovitch, S.
The influence of various soils on the mineral composition of banana leaves.
Ktavim, 1958, **8**: 255-72, bibl. 50.

Leaves of mature plants and of suckers were sampled from plants growing on 3 different soil types. The mineral composition of mature leaves differed only slightly, but that of young leaves differed markedly according to soil type. Young leaves from plants on calcareous soils contained relatively high Ca, Mg and ash, but low K. This lack of balance may account for the observed poor growth of suckers on calcareous soils. [For a preliminary account of this work see *H.A.*, 28: 1845.]

1880. DUMAS, J., AND MARTIN-PRÉVEL, P.
Contrôle de nutrition des bananeraies en Guinée. (Premiers résultats.) **(Nutritional control in banana plantations in Guinea. Preliminary results.)**
Fruits d'Outre Mer, 1958, **13**: 375-86.

This study was undertaken on about 20 plantations of the dwarf banana variety Petite Naine in an area with a pronounced dry season. Foliar diagnosis studies and soil analyses were made for N, P, K, Ca, Mg and particularly the ratios between K and other elements. P was found to be in sufficient supply, but K applications were generally necessary and yields depended largely on the balance between K and N, Ca and Mg. Figures are given for optimum contents of these elements and for the K/N ratio. The "yellow pulp" condition due to premature and abnormal fruit development appeared to be related to K excess. Studies of soil pH were also made.—I.F.A.C., Paris-Foulaya.

1881. BUDDENHAGEN, I. W., AND SEQUEIRA, L.
Disinfectants and tool disinfection for prevention of spread of bacterial wilt of bananas.
Plant Dis. Reptr, 1958, **42**: 1399-1404, bibl. 2, illus.

In the laboratory 18 chemicals were tested for disinfecting tools which might transmit *Pseudomonas solanacearum*. Only formaldehyde was considered satisfactory for field use. Complete disinfection was only achieved when pruning knives were completely immersed in a 10% solution of formaldehyde for 10 seconds.—Coto Res. Stat., Golfito, Costa Rica.

1882. PEARSON, A. J. A.
Banana spraying with mineral oils, a new control for leaf spot.
Span, 1958, No. 3, pp. 2-4, bibl. 7, illus.

In trials in Jamaica a wide range of mineral oils for low volume application gave good control of *Mycosphaerella musicola*. As regards phytotoxicity, however, it was found necessary to use highly refined oils with an unsulphonatable mineral residue value as high as was economically justifiable. Viscosity and type (paraffinic or naphthenic) were less important. The physical specifications of oils found suitable are indicated.—Agric. Res. Centre, Woodstock.

1883. WOLF, J.
Organic acids of bananas. [German?]
Z. LebensmittUntersuch., 1958, **107**: 124-31, bibl. 12, from abstr. in *J. Sci. Food Agric.*, 1958, **9** (12): 282.

The fruit flesh of bananas from Colombia contained malic and citric acids. In large fruits (130 g.) malic acid predominated; in small fruits citric acid was present in greater quantity than malic acid. Notable quantities of H_3PO_4 occurred as well as an unknown acid fraction in slightly larger concentration, and acetic and formic acids were present in very small concentration. The concentration of acids reached maximum values when the fruit began to turn yellow.

1884. TAS, R. N.
Essais de destruction chimique de bananiers. **(Trials on the chemical destruction of bananas.)**
Paper read at *1st Afr. Weed Control Conf.*, 1958, pp. 8, bibl. 6.

Top growth of bananas has been destroyed in a few days by injecting each pseudostem with 15 ml. 0·5% a.e. 2,4-D (isopropyl) 5–10 cm. above the ground in mid-February; water and oil formulations were equally effective. Each pseudostem must be treated to prevent regrowth. Spraying in March with 0·2% a.e. of 2,4-D+0·25% wetter at 200–300 ml./pseudostem was quicker, cheaper and more effective than injection; the youngest leaf of each pseudostem was treated in each case. Where regrowth occurs it must be treated to secure eradication. Plants affected with bunchy-top responded to sprays as well as healthy plants, but not quite so well to injection. Varietal differences in response to treatment appear to occur. Chemical methods cost less than 10% of hand clearing.—*Weed Abstr.*, **7**, No. 2178.

Cacao.

(*See also* 1982c, e, g, j, k, m, v, y, 1983p.)

1885. MORA URPI, J.
Notas sobre el posible origen y la variabilidad del cacao cultivado en la América tropical. **(Note on the possible origin and the variability of cacao grown in tropical America.)** [English summary 18 lines.]
Turrialba, 1958, **8**: 34-43, bibl. 30, illus.

Cacao populations are considerably more variable in Central than in South America, all the known types being present in the former region. The original type was possibly the form *pentagona*, native to Central America.

1886. GUATEMALA, MINISTERIO DE AGRICULTURA.
Investigación agropecuaria. Cacao. **(Agricultural research. Cacao.)**
Inf. an. Minist. Agric., Serv. co-op. interamer. Agric. 1957, pp. 131-7.

Cacao seedlings for rootstocks were grown in plastic bags in furrows 4 in. deep and 1 ft wide under hevea trees. *Musa violacea*, *Inga radians* and *Cajanus indicus* are now also in use as shade for this purpose. When cuttings were placed in plastic bags of soil under plastic tents, with intermittent misting, 85–90% rooting occurred.

1887. MURRAY, D. B.
Response of cacao to fertilizers.
Nature, 1958, **182:** 1613, bibl. 3.

In an experiment in Trinidad cacao was grown under artificial shades of slats and planted in a factorial NPK layout. Yields at 3 years of age showed that, at less than about 50% of full light, light is limiting to yield, but that, at higher percentages of full light, nutrition limits yield. Light intensity and nutritional status interact and neither should be considered independently.—Imp. Coll. trop. Agric., Trinidad.

1888. JONES, T. A., AND MALIPHANT, G. K.
Yield variations in tree crop experiments with specific reference to cacao.
Nature, 1958, **182**: 1613-14, bibl. 2.

Mean yields of clonal cacao during the 6th to 8th years were closely correlated with tree girth at 3½ years. This indicates that yielding capacity and variations in yield had been largely determined by variables operative during establishment [see also *H.A.*, 29: 863]. It is also suggested that checks to development are permanent and cannot later be rectified. The implications as regards experiments with tree crops are discussed.—Imp. Coll. trop. Agric., Trinidad.

1889. THRESH, J. M.
The spread of virus disease in cacao.
Tech. Bull. W. Afr. Cocoa Res. Inst. **5**, 1958, pp. 36, bibl. 70, illus., 2s. 6d.

This bulletin is a review of present knowledge regarding the incidence of new outbreaks, the pattern and rate of spread, and the various factors influencing the spread of disease. Control measures are considered, including eradication, ancillary use of insecticides, the planting of resistant varieties and mild strain protection.

1890. ROELOFSEN, P. A.
Fermentation, drying, and storage of cacao beans.
Reprinted from *Advances Food Res.*, 1958, **8**: 225-96, bibl. pp. 6.

Following a brief introduction this detailed review covers the subject under the following main headings: Essentials of methods used in cacao processing; Histology of the seed; External or microbiological fermentation; Internal or enzymatic fermentation and consequences; Storage of commercial cacao in a tropical climate; and, very briefly, Needed research. The work examined is largely that published since Knapp reviewed the subject in his book *Cacao fermentation* in 1937. The microbiological and biochemical changes that occur during fermentation and drying receive particular attention.

1891. HAYNES, D. W. M.
Cocoa drying.
Malay. agric. J., 1958, **41**: 88-96, illus.

Investigations on the drying of cacao beans have provided information on the following characteristics of wet and dry beans: moisture content, weight/volume relationships, resistance to air flow, heat required to evaporate a given quantity of water and the corrosion and staining that occurs when beans are in contact with various metals. Three hot-air driers used in the investigations are described. One of these was a small electrically-heated rotary drier for drying small batches in the laboratory. The second was a simple tray drier with a surface area of 36 sq. ft, and the third was a locally constructed "Cameroons drier" in which old tar barrels were welded together to form fire tubes.

Coconuts.

(*See also* 1872, 1913, 1982n, 1983i, t.)

1892. WILSON, T. B.
The West Johore coconut production survey.
Bull. Dep. Agric. Fed. Malaya **104,** 1958, pp. 47, bibl. 31, illus.

This report provides information on smallholders' coconut production over an area which equals one quarter of the coconut acreage of Malaya and which needs rehabilitation. The design and organization of the survey are described and the information obtained from it is presented with the aid of numerous tables. Only a tenth of the holdings exceed 10 acres in size. Palm densities are below the optimum with an average of only 35 per acre. The taper-top condition is exceedingly prevalent, two-fifths of the palms showing severe symptoms. Coconut production is poor, averaging only 23 nuts per palm, and 41% of the palms produced only 8% of the nuts. Only 4% of the palms bore large bunches totalling over 60 nuts. One acre and one holding in every 10 were completely barren. Copra recovery rate was 330 nuts per pikul (133⅓ lb.). Recommendations for replanting are made: these include drainage, the destruction of useless palms with care to avoid *Oryctes* breeding on a large scale, inter-cropping with high-income crops, and the use of improved planting material.

1893. DE BARJAC, H., AND ROCHE, A.
La symbiose rhizobienne sur *Centrosema* du Dahomey. (**The symbiosis of *Rhizobium* and *Centrosema* in Dahomey.**)
Oléagineux, 1959, **14**: 11-15, bibl. 5, illus.

The results of an experiment in Dahomey are given in which coconuts had greater numbers of leaves and higher N contents in plots devoid of a *Centrosema* cover crop compared with those growing with *Centrosema*. This appeared to indicate a competition for N between the coconuts and *Centrosema* in spite of its leguminous nature. Pot experiments are described in which *Centrosema* seeds were inoculated with *Rhizobium* cultures grown from *Centrosema* plants. The subsequent growth of the inoculated *Centrosema*, its weight and its N content were greater than those of uninoculated controls. The author concludes that the explanation of the coconut experiment does not lie in any lack of symbiosis between *Centrosema* and *Rhizobium*.

1894. VANDERPLANK, F. L.
Studies on the coconut pest, *Pseudotheraptus wayi* Brown (Coreidae), in Zanzibar. I. A method of assessing the damage caused by the insect.
Bull. ent. Res., 1958, **49**: 559-84, bibl. 11, illus.

Damage by the pest causes immature nuts to fall from the palm, and these show characteristic lesions below the calyx. Some undamaged nutlets also always fall from healthy palms. By collecting 100 fallen nutlets from 10 acres at random and counting those showing *P. wayi* damage, a figure called the "vidaka damage rate" is obtained. This is shown to be a good measure of the damage caused by the insect and also of the yield of the palms a year later. The growth, flowering and fruiting habits of the coconut palm in Zanzibar are also described.—Coconut Pest Res. Scheme, Zanzibar.

1895. YEO, D., AND FOSTER, R.
Preliminary note on a method for the direct estimation of populations of *Pseudotheraptus wayi* Brown on coconut palms.
Bull. ent. Res., 1958, **49**: 585-90, bibl. 4.

Records, sufficiently consistent for use in assessing the value of control measures, were obtained by climbing the palms and catching the nymphs. These were then classified by instars and replaced. The average catch was one nymph per palm, representing about one quarter of the total nymphal population. Adults, being able to fly, cannot be assessed in this way.—Colon. Pestic. Res. Unit, Arusha.

Coffee.

(*See also* 1841, 1872, 1982o, t, w-y, 1983b, c, e, h, k, n, o, s.)

1896. COFFEE RESEARCH STATION, RUIRU, KENYA.
Annual Report of the Coffee Research Station, Ruiru, and Coffee Research Services, Kenya, for 1956-7, 1958, pp. 106, bibls, Shs 25.

Coffee research progress in Kenya has previously been reported in the Annual Reports of the Department of Agriculture, and this is the first time it has been published separately. This first report contains full details of the numerous experiments, including their objects, layout, planting history and results to date. In future reports these basic details will be included only for new trials. [For a short account of the progress of this research in 1957-58, see *H.A.*, 28: 4077.]

1897. TANGANYIKA (SANDERS, F. R.).
Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, Tanganyika, for the 1956-57 Season, pp. 14.

Investigations on which progress is reported include: *Improvement of planting material:* selection trials, breeding. *Improvement of growing conditions:* cultural experiments on mulching, irrigation, fertilizers and interplanted bananas; pruning and spacing trials. *Nurseries:* seed germination. *Pests and diseases:* white stem borer, antestia, thrips, stem pitting or "bottling".

1898. GUATEMALA, MINISTERIO DE AGRICULTURA.
Investigación agropecuaria. Çafé. **(Agricultural research. Coffee.)**
Inf. an. Minist. Agric., Serv. co-op. interamer. Agric. 1957, pp. 98-104, 138-41, 147-8, 159-61.

Atomic fission products have been used for treating coffee seed in plant breeding. Propagators in the form of miniature polythene greenhouses have given very promising results in rooting cuttings. Rice husks used as a propagating medium were toxic to the plants. Grafting of arabica coffee onto rootstocks of *Coffea canephora*, *C. liberica* and *C. stenophylla* has been carried out in an attempt to increase resistance to root diseases and to drought. In the first harvest from unshaded, strip-cultivated coffee yields from plots planted at 3 rows per strip were higher than from plots planted at 2 rows per strip, but elsewhere with older trees in established strips the reverse tendency was evident. In experiments carried out on direct sowing, neither black polythene nor aluminium foil was entirely satisfactory for mulching; the former checked germination and the latter was not durable. The germinating capacity of seeds was highest when the fruit was just sufficiently ripe for harvesting. When planting out, 45° appeared to be the optimum inclination for plant stems. Coffee pulp used as a manure was improved in action by the addition of either of the inoculants Saprofil or Edaphon. Machines and processes for depulping, mucilage removal, washing and drying coffee beans are described. Preliminary trials indicate that ultrasonic irradiation accelerates mucilage removal by artificial enzymes. Resistance to [stem] canker was proved in *C. stenophylla*, *C. liberica* vars *arnoldiana*, *abeokutae* and *excelsa*, and in various hybrids. Complete protection from canker was given by applying a paste of Cupravit, talc and oil to the bark. Leaf spot (*Mycena citricolor*) was completely controlled by 3 applications, 20 days apart, of Tuzet (ziram) at 600, 600 and 400 g. per 100 gal. of water. Grasses and herbaceous broad-leafed weeds (with the exception of an unspecified member of the Convolvulaceae) were controlled by a mixture of dalapon and 2,4-D, and all the weeds present, except *Salvia obscura*, were killed by Karmex. Local responses of coffee to the major nutrients are briefly recorded. In a locality where the soil was not deficient in B, no toxicity symptoms developed in coffee after applying B at 13 kg. per ha.

1899. Godoy, C., Jr.
Forçamento de mudas de café. (**Forcing coffee seedlings for transplanting.**) [English summary 9 lines.]
Riv. Agric. Piracicaba, 1958, **33**: 179-85, bibl. 9, illus.

Uniformly undersized coffee seedlings with 3–4 pairs of leaves were selected from a nursery in which they were growing in individual pots of a 2: 1 mixture of soil and farmyard manure. Fortnightly spraying was carried out for 6 months with either (A) an inorganic mixture of 50 g. of superphosphate, 25 g. of sodium nitrate and 10 g. of potassium chloride per 10 l. of water, or (B) 5 g. per l. of water of a mixture of 37 g. of ammonium phosphate, 42 g. of potassium nitrate and 21 g. of urea. The controls received only water. After 4 months both groups of treated plants were markedly taller, greener and more uniform that the controls. Final statistical investigation showed that the controls were significantly inferior in height, fresh weight, number of leaves and number of branches. Plants of group B were superior to those of group A, but the only significant difference was in fresh weight.

1900. Kuppuswami, B. S., and Narayanan, B. T.
Preliminary studies on the effect of gibberellic acid on arabica coffee seedlings.
Sci. and Cult., 1958, **24**: 184-5, bibl. 2.

Foliage sprays were more effective than application to the soil. Concentrations of 50 and 100 p.p.m. caused increased growth, mainly by internode extension. An increase in the weights of both shoots and roots was caused by the 100 p.p.m. spray without undue change in the ratio between them.—Coffee Res. Stat., Balehonnur.

1901. Suárez de Castro, F., and Rodríguez G., A.
Movimiento del agua en el suelo. (Estudio en lisímetros monolíticos.) (**Movement of water in the soil. A study with monolith lysimeters.**) [English summary $\frac{3}{4}$ p.]
Bol. téc. Fed. nac. Cafet. Chinchiná-Caldas, 1958, **2** (19): 1-35, bibl. 18, illus.

On the basis of a 5-year study of soil erosion and run-off, creeping plants are recommended as cover crops in coffee plantations, with strips of barrier plants set along the contours at distances depending on the slope. The cover crop should be cut at the beginning of the dry season to prevent it competing with the coffee for soil moisture.

1902. Machado S., A.
Algunos resultados experimentales con fertilizantes en cafetos. (**Some experimental results with fertilizers on coffee.)**
Cenicafé, 1958, **9**: 157-98, bibl. 54.

Fertilizer experiments were carried out over a wide area in Colombia. Yield responses and leaf composition are recorded for the various treatments, and general conclusions and recommendations are given. The commonest problem was K deficiency. Where nutrient levels were either low in K or high in P, yields were reduced by the application of N. Foliar levels of nutrients associated with good yields were 2·5–3·0% N, 0·11–0·15% P_2O_5, 1·50–2·0% K_2O, 0·7–1·3% Ca and at least 0·35% Mg. The threshold of Mn toxicity was not determined, but foliar Mn values of 200 p.p.m. or more indicated distinct excess. Very high K levels were sometimes associated with Mn deficiency values of 50 p.p.m. or less. In an unshaded plantation a 10–5–20 fertilizer gave a 100% yield increase. Until the 9th year there was generally a positive correlation between yield and trunk diameter. Organic manure, especially decomposed coffee pulp, applied with mineral fertilizers in new plantations had a residual action lasting 3–4 years, and the same residual effect was recorded after 3 annual applications of 500 g. of K_2O per bush.

1903. Bonnet, J. A., Riera, A. R., and Lugo-López, M. A.
Lack of response of old coffee trees grown in Alonso clay to lime and phosphatic fertilization. [Spanish summary $\frac{1}{2}$ p.]
J. Agric. Univ. P.R., 1958, **42**: 161-7, bibl. 15.

In 1953 an experiment was laid out in old coffee growing in a clay soil with a pH of about 4·2. All trees received a basic dressing of N at 108 lb./acre and of K_2O at 60 lb. Half the plots received lime at 4 tons/acre. P was applied as super- and hyperphosphate at rates equivalent to 0, 50, 125 and 200 lb. P_2O_5/acre. With the exception of the lime the same fertilizer treatments were repeated in each of 3 succeeding years. Neither the lime nor the P treatments had any significant effect on coffee yields.

1904. Bock, K. R., Robinson, J. B. D., and Chamberlain, G. T.
Zinc deficiency induced by mercury in *Coffea arabica*.
Nature, 1958, **182**: 1607-8.

Symptoms of zinc deficiency, later confirmed by analysis, occurred 4–5 months after spraying against coffee berry disease with phenyl mercury acetate [see also *H.A.*, 28: 1880]. The reduction in zinc content was greatest at the distal ends of the shoots, and those shoots most exposed to the direct rays of the sun suffered most severely. Relatively less soluble formulations such as phenyl-mercury-8-hydroxy-quinoline caused less severe symptoms. A similar symptom effect has also been observed after spraying with a formulation containing arsenic.—Dep. Agric. and E.A.A.F.R.O., Kenya.

1905. Gaie, W., and van Helmont, M.
Régénération rapide d'une jeune plantation de caféiers d'Arabie grêlée. **(Rapid regeneration of a young arabica coffee plantation damaged by hail.)**
Bull. Inf. I.N.É.A.C., 1958, **7**: 385-7, illus.

The plants were 1½–2 years old. A few weeks after the damage had occurred, vigorous sucker growth was observed. Four suckers were selected on each tree and their development encouraged by cutting back, first 2 and later all of, the old stems. Eight months after the storm 95% of the trees had 3 well-placed shoots 85 cm. in length.

1906. Weber, G. F., and Abrego, L.
Damping-off and thread blights of coffee in El Salvador.
Plant Dis. Reptr, 1958, **42**: 1378-81, illus.

Damping-off of coffee seedlings by *Corticium rolfsii* is described; for its control sanitary precautions during compost preparation and the application of an organic mercury dressing to the seedlings are recommended. *Rhizoctonia ramicola*, causing silky thread blight, may be controlled by any of the currently recommended fungicides.—Inst. salvador. Invest. Café, Santa Tecla.

1907. Dias, M. A., and Contreiras, J.
Aspectos fisiológicos da imunidade-susceptibilidade do cafeeiro à *Hemileia vastatrix*. Determinação da turgidez relativa em cafeeiros imunes e susceptíveis. **(Physiological aspects of immunity and susceptibility of coffee bushes to *Hemileia vastatrix*. Determination of relative turgor in immune and susceptible coffee bushes.)** [English and French summaries 2 pp. each.]
Rev. Café portug., 1958, **5** (18): 40-58, bibl. 7, illus.

Under the conditions of the experiment resistance of coffee plants to rust (*Hemileia vastatrix*) was not correlated with leaf turgor. The method used of measuring "relative turgidity", which was based on that evolved by Weatherley, is described and discussed in detail.—Estaç. Agron. nac.

1908. Leiderman, L., and Calcagnolo, G.
O combate ao bicho mineiro do cafeeiro por meio de polvilhamentos com inseticidas orgânicos. **(Control of coffee leaf miners by dusting with organic insecticides.)**
Biológico, 1958, **24**: 115-29, bibl. 14.

Dusting was carried out at intervals of 3 and 5 weeks over a 5-month period, using 4 single insecticides and a mixture. The best results were obtained with the mixture, consisting of 10% toxaphene and 0·5% parathion, applied at the shorter intervals, which reduced the population of *Perileucoptera coffeella* by 72·1%. The corresponding reduction with parathion alone was 55·2% and with 1% BHC, 50·6%. Results were poor with toxaphene alone and very poor with 1·5% dieldrin. At intervals of 5 weeks, only the mixture gave a satisfactory (53·4%) reduction. The greater frequency of this treatment was not justified economically, but against heavier infestations, 4 applications might be necessary. [For earlier work on spraying see *H.A.*, 28: 1886.]

1909. Blumer Dias, L. C.
Contrôle do bicho mineiro do cafeeiro nos estados de São Paulo e Espirito Santo—Brasil—1957. **(Control of the coffee leaf miner in the states of São Paulo and Espirito Santo, Brazil, 1957.)**
Bol. Super. Serv. Café, S. Paulo, 1958, **33** (378): 31-41, bibl. 19.

Emulsionable 82·5%-active toxaphene, used at 4 kg. of the commercial product per 1,000 plants as a low-volume spray, gave very good (in some instances 100%) control of coffee leaf miners (*Perileucoptera coffeella*). It was far more satisfactory than 20% toxaphene dust, with or without parathion or malathion, and still more effective than 1·5% BHC dust.

1910. Ribeiro (Filho), J.
Colheita do café. **(Harvesting coffee.)**
Rev. Ceres, 1958, **10**: 380-91, bibl. 18.

Harvesting by hand not only gives a final product of high quality, but is shown to be more economical than shaking berries from the trees into cloths or baskets or onto the ground, or than letting them fall naturally before collecting them from the ground.

Mangoes.

1911. Le Bourdellès, J.
Observations sur les variétés de manguiers de la Station Centrale de l'I.F.A.C. en Guinée. **(Observations on the mango varieties at the Central Station of the I.F.A.C. in Guinea.)**
Fruits d'Outre Mer., 1958, **13**: 331-8, illus.

Details of fruit quality, behaviour, yield, fruiting time and dimensions are given for 12 mango varieties growing in central Guinea. The varieties Irwin, Zill, Smith, Ruby, Kent and Keitt are tentatively recommended as the most suitable.

1912. Das-Gupta, S. N., and Sen, C.
On the prevention of mango necrosis.
Curr. Sci., 1958, **27**: 446-7, bibl. 2.

Necrosis of the distal ends of mango fruits caused by brick-kiln fumes was controlled by spraying 3 times with 6 lb. borax per 100 gal. water, before flowering, during flowering and immediately after fruit setting.

Oil palms.

(*See also* 1982y, 1983 l.)

1913. Manuel Patiño, V.
Cristobalino, un nuevo procedimiento para acelerar la germinación de algunas semillas. **(Cristobalino, a new technique for hastening the germination of certain seeds,)**
Agric. trop. Bogotá, 1958, **14**: 587-9.

The pulp is removed from oil palm seeds and they are put in a double sack. This is left immersed in running water at night, exposed to the sun in the morning and hung in the shade during the afternoon. After 4 days of this treatment, the seeds are left under cover for about a week, until the operculum covering the germination pore begins to lift, when they are planted in beds of soil. In a preliminary trial, with the slight modification of hanging the sack under a running tap instead of leaving it submerged, germination took only 6 days. The method is particularly suited to the humid tropical climate of the Pacific coast of Colombia. In this region, coconut germination is encouraged by lifting strips of the husks from ripe nuts and tying the nuts together by these in pairs, hanging the pairs over branches or over the projecting outer ends of the roof beams of huts and leaving them exposed, where they begin to germinate in the air.

1914. Bull, R. A.
Symptoms of calcium and phosphorus deficiency in oil palm seedlings.
Nature, 1958, **182**: 1749-50, bibl. 3, illus.

The technique of inducing symptoms in seedlings grown in purified quartz sand is described. Symptoms of P deficiency included a reduction in growth and vigour, chlorosis of emerging leaves and terminal necroses in older leaves. The symptoms indicated that in P-deficient leaves cells collapse rather abruptly. Symptoms of Ca deficiency included the production of short, narrow, rigid leaves with prominent veins. There was a progressive reduction of leaf area, which exceeded 90% in the leaves that were most malformed. Terminal necrosis also became severe, but no chlorosis was observed.—W. Afr. Inst. Oil Palm Res., Benin, Nigeria.

Papaws.

(*See also* 1983w.)

1915. Awada M.
Relationships of minimum temperature and growth rate with sex expression of papaya plants *(Carica papaya. L.)*
Tech. Bull. Hawaii agric. Exp. Stat. **38**, 1958, pp. 16, bibl. 5, illus.

Floral records were taken from plants of the variety Solo grown at 100 ft, 1,500 ft and 2,100 ft elevations. The hermaphodite flowers were classified as 2, 3, 4 or 4+, the first being the most pistillate and the last the most staminate. Significantly greater percentages of types 2 and 3 than of 4 and 4+ were borne at the two higher elevations, the differences being associated with differences in minimum temperatures. Within types 2 and 3, however, more flowers of type 2 were produced at 1,500 ft than at 2,100 ft, in spite of the lower minimum temperatures at the highest elevation. This is thought to be due to a relationship between carpellody and growth rate.

1916. Decker, J. P., and Tió, M. A.
Photosynthesis of papaya as affected by leaf mosaic. [Spanish summary 5 lines.]
J. Agric. Univ. P.R., 1958, **42**: 145-50, bibl. 2, illus.

The photosynthetic rate of attached healthy papaw leaves ranged from 2·30 to 3·46 μg. $CO_2/sec/dm^2$ compared with 0·32 to 2·03 for the leaves of diseased plants. The mean rate for diseased plants was only 36% of that of normal plants. The apparatus used is described.

1917. Lange, A. H.
Papaya for export: replanting and other problems.
World Crops, 1958, **10**: 448-50, bibl. 8, illus.

Various pests and diseases are considered. For mites, wettable sulphur at 5 lb. per 100 gal. or a light dusting with sulphur controls *Hemitarsonemus latus* and *Brevipalpus phoenicis; Tetranychus telarius* may be controlled by wettable Chlorobenzilate at ¼ lb. a.i. per 100 gal. Nematode control is also discussed [see *H.A.*, 28: 4113 and 4114]. Storage rots and powdery mildew are mentioned briefly.—Hawaii agric. Exp. Stat., Honolulu.

Pineapples.

1918. Pélegrin, P.
Ananas en culture sans sol. **(Growing pineapples without soil.)**
Fruits d'Outre Mer, 1958, **13**: 401-9, illus.

Glasshouse experiments on growing pineapples in water culture and in various aggregates are described. Gravel, vermiculite and plastic granules were tested. Spherical granules, 2 mm. in diameter, of polythene made an ideal medium.—Centre nat. Rech. sci. Gif-sur-Yvette.

1919. Chen, C. C., Fang, T. T., and Ling, R. S.
Effects of fertilization on growth, nutrient level and yield of pineapple. [Chinese, with English summary 1 p.]
Mem. Coll. Agric. nat. Taiwan Univ., 1957, **5** (1): 15-26, bibl. 31.

A 2-year experiment repeated in 2 localities is described, in which N, P and K were applied at different rates and seasons. A total application of 1,200 kg./ha. (made up of 700 kg. ammonium sulphate, 300 kg. superphosphate and 200 kg. potassium chloride), which is the amount usually applied in Taiwan, proved adequate, and doubling this rate of application did not increase yields, though it seemed to increase plant vigour and sucker and slip production. The treatment which gave the best yields was one in which all the P and K were applied in October and the N applied in 3 equal dressings in October, March and August. N and P had little effect on fruit quality, but K tended to improve quality and appearance. Reducing the total amount of fertilizer applied to 600 kg./ha. had little effect on fruit size or weight, but it delayed flower bud differentiation and tended to delay fruit maturity. Neither doubling nor halving the rate at which fertilizer was applied had an appreciable effect on leaf contents of N, P and K.

1920. Su, N.-R.
The response of pineapples to the application of potassium chloride. I. Plant crop. [Chinese summary 1 p.]
J. agric. Ass. China, 1958, No. 22, pp. 27-50, bibl. 13.

Five levels of potash were compared with a control plot (no K) in a 2-year trial with Smooth Cayenne pineapples. The optimum amounts of K_2O per plant were found to be 3 g. for the first application in September, 4 g. for the second and third applications in March and June, and 3 g. in the following September. Responses of fruit yield, average fruit weight and size to increasing K_2O levels showed diminishing returns. The use of potassium chloride significantly improved fruit quality, regardless of the K level. The percentage of plants bearing suckers was not related to K application. K also increased acid and vitamin C contents of the juice, and reduced the sugar/acid ratio. K delayed flower bud emergence by an average of 6 days and fruit maturity by about 4 days. Contents of leaf K were highest during the early stages of growth (June). They increased markedly with K applications up to the second increment, but only slightly with higher rates of application. Total and nitrate N contents showed an initial direct increase with increasing K. Nitrogen contents at the time of floral differentiation and P contents during June and at floral differentiation increased with K up to the second increment, but thereafter they decreased. Critical contents of leaf K are given in relation to final yield. Based on these results, suggestions are made for changing the time of application of K fertilizers to pineapples.—Tou-Liu Pineapple exp. Stat.

1921. Edmonstone-Sammons, C.
Some aspects of black spot in pineapple. [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1958, **1**: 111-20, bibl. 15.

Penicillium funiculosum and *Fusarium moniliforme* were the fungi most frequently isolated from diseased fruits, which showed brown to black areas immediately below the floral cavity. It has been found that infection generally takes place through the floral cavity and that the fungi cannot enter the fruit unless the epidermis has been broken. Factors which may cause cracking of the epidermis have not yet been determined, but certain possibilities are discussed. Sterilizing the floral cavities of fruitlets with mercuric chloride and bleaching powder reduced the numbers of contaminant fungi present.—Rhodes Univ., Grahamstown.

Rubber trees.

(*See also* 1982b, d, p, y, 1983a, j.)

1922. Rubber Research Institute of Ceylon.
Annual Report of the Rubber Research Institute of Ceylon, 1957, 1958, pp. 135.

Departmental reports include the following: *Botany:* Field trials of local and imported clones, crown budding experiments, and a wide avenue planting trial. *Plant Pathology:* For *Oidium* control sulphur dust at 12 lb./acre twice weekly gave best results. Against *Phytophthora* leaf disease copper-based dusts at 8–10 lb./acre at 5-day intervals were the best treatment; indirect control measures by reducing fruit set were unsuccessful. *Fomes lignosus* was effectively controlled by Tillex. *Agronomy:* Zinc status of rubber plants does not appear to be a major factor in *Oidium* susceptibility. Herbicidal experiments showed the effectiveness of a mixture of Amizole and pentachlorophenol against grasses. Latex stimulation caused a normal yield at first tapping after a period of rest. Studies of cover crops showed *Mikamia scandens* to have a K content 5 times higher than 3 other common legume covers. *Chemistry:* Ciba 1% dust with sticker was the most promising means of controlling *Phytophthora* leaf fall, in so far as copper contamination of scrap rubber was concerned.

1923. I.R.C.I.
Institut des Recherches sur le Caoutchouc en Indochine. Rapport annuel 1957. (**Annual Report of the Institute for Research on Rubber in Indo-China for 1957**), 1958, pp. 201.

Progress is reported on the following: selection and breeding, stock-scion relationships, tapping experiments, spacing trials, physiological diagnosis and fertilizer experiments, early selection of high yielders, latex stimulation, fungal disease control.

1924. Garot, A.
Mempertjepat seleksi hevea. (**Expediting hevea selection.**) [English summary 14 lines.]
Menara Perkebunan, 1958, **27**: 195-9, illus., bibl. 8.

A technique is described to force early flowering in hevea for breeding purposes. Young buddings, 8 months old, were topped to encourage branching, and some of the branches formed were ringed with wire when about 14 months old. Six months later, during the dry season, flowering occurred.

1925. Evers, E.
Densité et saignée en hévéaculture. (**Espacement and tapping in rubber growing.**)
Bull. Inf. I.N.É.A.C., 1958, **7**: 341-74.

The results of progressively thinning blocks of trees of 3 clones to varying extents are given in terms of growth, number of trees in tapping, production, rubber content of latex and disease incidence. It is recommended that the product of the number of trees per ha. and mean circumference should be kept constant at about 250 m./ha., and that thinning should entail the systematic removal of poor performers. Practical means of achieving this are described.

1926. Anon.
Establishment and maintenance of legume covers. Pretreatment of leguminous cover crop seeds.
Plant. Bull. R.R.I.M., 1958, No. 39, pp. 129-33 and 134-5.

For a vigorous cover under rubber a 5: 4: 1 or 2: 2: 1 mixture of *Calapogonium muconoides*, *Centrosema pubescens* and *Pueraria phaseoloides* is recommended. Advice on maintenance, particularly weed control, is given. The second paper recommends pretreating half the seed with sulphuric acid or hot water and inoculating the other half with a *Rhizobium* culture.

1927. Glennie, D. A. I.
The soil block method of establishing legume covers.
Plant. Bull. R.R.I.M., 1959, No. 40, pp. 11-17, illus.

Cheaper and more rapid establishment of such cover crops as *Pueraria* and *Flemingia* was achieved on a rubber estate by the use of soil blocks. Seed was treated with sulphuric acid, inoculated and germinated. The germinated seed was pricked out into the soil blocks and was ready for transplanting in the field 10 days later. A home-made block-making machine is described and costings are given.

1928. Riggenbach, A.
A note on the chemical control of the white root disease of rubber.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1958, **34**: 8-10, bibl. 2, illus.
Rubber Research Institute of Ceylon. **The white root disease of hevea, *Fomes lignosus*.**
Adv. Circ. Rubb. Res. Inst. Ceylon **62**, 1958, pp. 5.

Of numerous fungicides tested in the laboratory, Tillex, an organo-mercury compound, was the most effective against *Fomes lignosus*. Field experiments have shown that it can replace copper sulphate. It is recommended that, as a preventive, budded stumps should be dipped in 5% Tillex and allowed to dry before planting. Each planting site should then be thoroughly watered with ½–1 gal. of 1% Tillex, and this repeated 2 or 3 times at 2- to 3-month intervals. As a curative treatment the fungus should be scraped from the roots and all infected parts cut out. The roots should then be painted with 1% Tillex and, after replacing the soil, the area drenched with 1% Tillex.

1929. Riggenbach, A.
A new waterproof fungicide.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1958, **34**: 12, illus.

Kankerdood, a mercury-based product, is recommended to replace the water-miscible fungicides plus waterproof dressings used in the treatment of bark canker caused by *Phytophthora palmivora*. The canker area should be thoroughly cleaned and, when dry, painted with Kankerdood, which is not washed off by rain. The treatment should be repeated every 4 to 6 months.

1930. Risdon, E. J.
Further comments on the contamination of natural rubber by fungicidal dusts containing copper. Part I.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1958, **34**: 13-29.

The problem of copper contamination, which may not exceed a maximum tolerance of 8 p.p.m., is reviewed at length, and detailed suggestions are made regarding field practice and precautions to minimize contamination. Small-scale dusting experiments suggest that an approved 1% copper dust with a sticker should be used. The usefulness of rain guards and of electrodusting instead of normal dusting has not yet been demonstrated. [For earlier comments and another report see *H.A.*, 28: 1923 and 3118.]

1931. Thio Goan Loo.
Pra-koagulasi dari lateks kebun. (**Precoagulation of field latex.**) [English summary ½ p.]
Menara Perkebunan, 1958, **27**: 207-10, bibl. 8.

The various causes of pre-coagulation are discussed. Recommendations for its prevention include: cleanliness of receptacles, a premium for workers based on rubber content to discourage dilution with dirty water, tapping early in the morning so that the latex reaches the factory before 10 a.m., and, if necessary, the use of chemical anti-coagulants.

1932. de Souza, H. B.
O cipó babão (*Cissus gongylodes* Baker), um agente coagulante do latex de hevea. (***Cissus gongylodes*, a coagulant for hevea latex.**)
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 163-86, bibl. 13, [received 1958].

Extracts from *Cissus gongylodes*, a common wild plant in the Amazon region, gave results similar to those from acetic acid in the coagulation of hevea latex.

1933. Wisniewski, A.
A defumação do latex de seringueira. (**The smoking of hevea latex.**) [French summary 1¼ pp., English ¾ p.]
Bol. téc. Inst. agron. Norte, 1956, No. 31, pp. 275-88, bibl. 10, [received 1958].

Nut shells from *Attalea excelsa* and *Maximiliana regia*, or wood chips from *Manilkara huberi*, *Tabebuia* sp. or *Bertholletia excelsa* are recommended as fuel.

Sugar cane.

(*See also* 1353-1357, 1982a, i, s, z, 1983d, q, r, u.)

1934. South African Sugar Journal.
The South African sugar year book, 1957-58.
South African Sugar Journal, 321 Smith St., Durban, 1958, 10½×8½ in., pp. 275, illus., 10s. (post free).

The 28th edition of this comprehensive reference book contains special articles and reviews on sugar production, a statistical section, information of South African sugar milling enterprises, boards and associations, and notes on the milling industries of neighbouring countries. It is well illustrated and full of useful information, mainly on the industrial aspects of sugar production.

1935. South African Sugar Association.
Annual Report of the Experiment Station of the South African Sugar Association, Mount Edgecombe, Natal, for 1957-1958,
1958, pp. 33, illus.

Plant nutrition: The results of leaf and soil analyses and their relation to yield responses are described. Analyses of filter cake, molasses and bagasse are given. Treatment of cane with gibberellic acid caused rapid but temporary elongation; repeated doses had greater effects, but the treated plants were yellow and spindly. *Cane varieties:* Results of variety trials are given. Artificial induction of flowering was achieved by 10- or 18-hr photoperiods for 3 weeks followed by 12½-hr days, but not by 18-hr days followed by 10-hr days or by 10-hr days throughout. This indicated that sugarcane is not a long-short day plant as has been suggested. *Cane diseases:* Experiments on ratoon stunting disease, including varietal and fertilizer responses. *Entomology:* Investigations on deadheart caused by *Sesamia calamistis* larvae, defoliation by army- and trash-worms, and eelworm damage.

1936. Queensland (King, N. J., and others).
Fifty-eighth Annual Report of the Bureau of Sugar Experiment Stations, 1957-58,
Brisbane, 1958, pp. 111, illus.

The many projects on which progress is reported include the following: *Division of Soils and Agronomy:* fertilizer trials, potash nutrition, soil moisture studies, the possible role of nematodes in cases of poor growth and ratooning, brix determinations in varietal selection, germination after hot-water treatment, minor elements, weed control (reed grass and giant sensitive plant). *Division of Plant Breeding:* raising and selecting new varieties. *Division of Entomology and Pathology:* investigations into the control of numerous pests and diseases. Separate reports of individual Experiment Stations also include the results of variety trials and other activities.

1937. Coimbatore.
Annual Report of the Sugarcane Breeding Institute, Coimbatore, for 1955-56, [?1958], pp. 118, Rs. 2/25 nP. or 3s. 3d.

Research work in progress includes: *Breeding:* Production of Co. varieties; establishment of the World Collection at Taliparamba to avoid mosaic losses at Coimbatore. *Cytogenetical studies:* On the relationships between *S. officinarum* and both *S. spontaneum* and *S. robustum*. *Spontaneum Expedition Scheme and World Collection:* The present strength of the collection is 961 varieties; 900 more are to be imported. *Chemical studies:* Correlation between high N content in juice and darker colour in jaggery. *Physiological studies:* In studies of photoperiodism extra darkness induced marked early flowering in most varieties. *Mycological studies:* Inoculation experiments with *Glomerella tucumanensis*. *Entomological studies:* Tentative indications are that the internodal borer, *Proceras indicus*, prefers the 6th to 12th joint from the top, that thick varieties are more susceptible than thin and that humid conditions favour borer attack.

1938. Rao, N. V. M., and Lakshmikantham, M.
Sugarcane research at Anakapalle.
Sugar J., 1958, **21** (5): 26-9.

Progress is reported on the following: *Varietal trials:* Co. 997 being outstanding. *Nutrition:* Placement and foliar application of N, foliar diagnosis investigations, soil moisture and N relationships, effects of P on juice quality. *Pest and disease control:* Early shoot borer checked by DDT or endrin; varietal resistance trials to this pest and to smut and red rot. *Miscellaneous:* Improvement of juice sucrose by spraying and soil applications.

1939. Chen, Y. C.
A preliminary report on research and experiments on sugarcane varieties and cultural practices in the Pearl river delta. [Chinese, with English summary $1\frac{1}{4}$ pp.]
Acta agric. sin., 1958, **9**: 182-91, bibl. 3.

In variety trials P.O.J. 3016 and F.134 outyielded P.O.J. 2878. In cultural experiments yields were increased by deeper planting and earthing-up, by earlier planting and by interplanting with early soya beans. A rotation of 2 years' cane followed by 1 year each of jute and sweet potatoes was better than continuous cane cropping. Recommendations are made for manuring plant and ratoon crops.—Cane Sugar sci. Res. Inst., Kwangtung.

1940. Tabayoyong, F. T., and Ferraris, I. P.
Sugarcane variety experiments in the Victorias district during the 1956-57 and 1957-58 crop years.
Sugar News, 1958, **34**: 403-7, bibl. 1.

The most promising varieties arising from 38 trials are Co.440, Co.449 and C.P. 29/116. The first two germinate and stool well, grow fast and are fairly resistant to most local pests and diseases. The third should be planted from late July to late October to avoid premature tasseling. Co.440 is expected to become the major variety of the district. [For results of earlier trials see *H.A.*, 28:4127.]

1941. Farwell, F. E.
A new crop rotation system.
Sugar J., 1958, **21** (3): 36.

For a two-year fallow in cane fields ideal cover crops are the annual and biennial white sweet clovers (*Melilotus alba*), vars Floranna and Hubam respectively. These reseed themselves successfully if the first year's cover is ploughed in.

1942. Lyons, E. S.
Recovery of yields in sugarcane from adequate fertilization of low fertility land.
Agron. J., 1958, **50**: 762, bibl. 1.

In a 5-year rotation on fine sandy loam, sugar cane occupied 3 years, following green manure and sorghum. Differential fertilizing was continued for 7 years, omitting all 3, or 2, or 1 of the major nutrients entirely, and reducing N to half the standard rate in some combinations. The standard plots received N, P_2O_5 and K_2O, each at 72 lb. per acre, and this was resumed on all the experimental plots in the 8th year. Omission of K caused a greater reduction in sugar yield than omission of N or P. There were comparatively small differences in yield in the very first year after returning to normal fertilizing, the range being approximately 86–98% of the standard, whereas it had been approximately 46–94% during the period when nutrients were omitted. The greater the original reduction of yield, the more marked was the recovery on restoring standard fertilizing.—U.S.D.A., Cairo, Ga.

1943. Bonnet, J. A., Riera, A. R., and Roldán, J.
Yield responses to different N-P-K levels, and correlations with foliar analysis, in sand culture studies with corn, sugarcane and cotton. [Spanish summary $\frac{1}{2}$ p.]
J. Agric. Univ. P.R., 1958, **42**: 168-84, bibl. 8, illus.

In so far as sugar cane is concerned some of the results obtained in the investigations described here have already been reported [*H.A.*, 27: 914]. Data are tabulated here showing yields (cane, sugar, trash and roots) of M.336 receiving different amounts of N, P and K. Significant correlations were obtained between the relative yield of cane and the arc-tangent N contents of the leaves of the plants, when these were 4 and 5 months old. Significant correlations were also obtained for arc-tangent P contents when the plants were 3 or 4 months old, but no correlations were found for arc-tangent K contents.

1944. van Schuylenborgh, J., and Sarjadi, R. M.
On the fertilization of sugar cane.
Neth. J. agric. Sci., 1958, **6**: 256-66, bibl. 27.

Soil and leaf analyses in Indonesia have shown that the sugar cane crop removes an average of 100 kg. N, 100 kg. PO_4, 350 kg. K, 30 kg. Ca and 20 kg. Mg per ha. per annum from the soil. Results from fertilizer trials have emphasized the relationship between sucrose percentage and N, P and K contents. When the leaf N content was sufficiently high, the sucrose percentage and the K/PO_4 ratio in the leaf were related, with the optimum value for the ratio appearing to lie between 5·5 and 6·5. With adequate N and PO_4 contents, there was a direct relationship between the sucrose percentage and the leaf K content. The sucrose percentage was also related to the K/PO_4+N, K/PO_4 and K/N ratios. When the leaf K content was adequate, the sucrose percentage and the PO_4/N ratio in the leaf were related, with an optimum value of 0·215. Nitrogen had the greatest effect on cane production, but tended to reduce sugar yields.

1945. Cross, W. A.
Sugar cane fertilization in Argentina.
Sugar J., 1958, **21** (6): 34-6.

A dressing of 50 kg./ha. of N is the most economic. Application just prior to harvest to assist ratooning is of value. The use of filter press cake and fermented liquor residues and of lime on acid soils is also recommended.

1946. Singh, A., and Singh, B.
Nitrogen content and yield of some sugarcane varieties.
Curr. Sci., 1958, **27**: 393-4, bibl. 6.

The average cane yields over a 4-year period of 5 cane varieties, growing in a variety trial, were compared with the nitrogen contents of stalk samples of the same varieties taken in the last year of the trial. The figures confirmed the inverse yield/N relationship found by other workers.—Indian Inst. Sugarcane Res., Lucknow. J.R.L.

1947. BHATTA, K. L., AND NARAYANAN, B. T.
The nitrogen requirement of sugarcane in Mysore.
Indian J. agric. Sci., 1957 (issued 1958), **27**: 427-44, bibl. 30.

The results of trials on 3 stations indicated a high requirement varying from 300 lb. N to 400–450 lb. N per acre. At least half the N should be in inorganic form, and a basal dressing of green manure or compost equal to 100 lb. N per acre, followed by oil cake or ammonium sulphate in equal proportions to make up the balance, is recommended. Applications of more than 500 lb. N per acre tend to depress sugar content. No significant interaction between N treatments and varieties was observed.

1948. PATIL, S. V., TIPPANNAVAR, M. B., AND KULKARNI, M. V.
Effect of spacing-*cum*-nitrogen application on the yield of sugarcane in Malnad tract.
Mysore agric. J., 1958, **33**: 66-70, bibl. 6.

In a 3-year experiment involving 2 N levels and 3 spacings 225 lb./acre of N increased the yield by 5 to 10 tons/acre over that obtained with 150 lb. N. Where average yields were low 2-ft spacing was best, but where average yields were 35 to 55 tons/acre 3-ft spacing was better and also more convenient for bullock-drawn cultivation implements. Wider spacing (4 ft) resulted in fewer, shorter and also thinner canes.

1949. VALLANCE, L. G.
Does it pay?
Cane Grs' quart. Bull., 1958, **22**: 71-2.

In an experiment, in which nil, 1, 2, 3, 4 and 5 cwt. of ammonium sulphate per acre were applied to sugar cane, the weight of cane per acre increased from 46 to 67 tons/acre with increasing N, but the sugar content fell. The maximum net return was obtained from the 2 cwt./acre dressing.

1950. WESDORP, J.
Aerial application of urea.
Cane Grs' quart. Bull., 1958, **22**: 57-9, illus.

The cost was 16 shillings for an application of 80 lb./acre plus 3 shillings for every additional 20 lb./acre. Airstrip requirements and flying organization are briefly discussed.

1951. TSENG, P. M., AND LOH, C. S.
Studies on the elongative growth of sugarcane: (II). The length and diameter of the stalk and their related factors. [Chinese, with English summary 3½ pp.]
J. agric. Ass. China, 1958, No. 22, pp. 5-26, bibl. 6, illus.

Data were obtained over 2 crop years on the growth of September-planted cane. In a stool secondary stalks accounted for 44·7% of the total weight, primary stalks for 33·3%, and tertiary stalks for 15%. The mother stalk accounted for 7% of the stool. Length of millable stalks was correlated with internode length rather than with internode number. In varieties with relatively long millable stalks the average length of internodes formed between April and September was 9 cm. The longest internodes were formed during the period May to July, under regular irrigation. Two types of stalk were distinguished, viz. the common type, in which internode diameter varied only slightly from top to bottom (varieties P.T. 50-2 and P.T. 50-60) and the bamboo-shoot type, in which the lower internodes had larger diameters than the upper internodes (P.T. 51-11). Stalk diameter was enhanced by dry conditions and low temperature, and in P.T. 51-11 was greatest in stalks formed between February and April. With cane planted in September the stalks which emerged in December and November accounted for 60·5% of the total stool weight at harvest. There was a tendency for the stalks which had emerged most recently to be the heaviest and longest in the stool. High temperatures in early summer increased respiration and therefore the rate of elongation of emerging stalks. Internode measurements taken in May showed that growth of tertiary internodes was about 4 times that of mother stalks (40·6 g. and 10·9 g. respectively). Some 49–65% of the yield per hectare is produced in the period June to September, and 17–42% during March to May. The main limiting factor for vegetative growth between June and September is the number of hours of sunshine, while in the March–May period it is rainfall. [For Part I see *H.A.*, 28: 922.]—Taiwan Sugar Corp.

1952. LAKSHMIKANTHAM, M.
Biochemical studies on sugarcane subject to swamp conditions.
Sugar J., 1958, **21** (7): 28-30.

Swamp-grown sugarcane flowered more extensively and had better juice quality than a normal crop early in the season, but the maximum sucrose content was less than the peak sucrose content found later in the season in a normal crop. Glucose, total and non-protein N, and ash were higher, and the P_2O_5 content lower, in swamp than in normal cane. Co.419 was the most promising variety under swampy conditions.

1953. (HEBERT, L. P., AND MATHERNE, R. J.)
Some canes damage less from hurricanes.
Agric. Res. Wash., 1958, 7 (4): 14, illus.

Observations after a severe storm in Louisiana indicated that C.P. 44-101 suffered the worst damage and N:Co.310 the least. C.P. 36-13, 29-116 and 47-193 were only slightly damaged. Studies on controlled breakage showed that breaking 20% of the stalks in late August reduced cane yield by 5% and sugar yield by nearly 10%. Breaking 100% of the stalks caused losses of 35% and 54%, respectively.

1954. Wang, C. S., and Wang, M. H.
Studies on the downy mildew disease (*Sclerospora sacchari* Miyake) of sugarcane. [Chinese, with English summary 1½ pp.]
J. agric. Ass. China, 1958, No. 22, pp. 51-62, bibl. 6.

Downy mildew was successfully controlled by: (*a*) immersion of diseased single-eye or two-eye setts in water at 45° C. for 1 hour, followed by drying at room temperature for 24 hours, then re-immersion at 52° C. for 1 hour, or by (*b*) a similar method, but with re-immersion in water at 55° C. for ½ hour. Germination and growth rate were improved by both methods of hot-water treatment. In field tests fortnightly applications of Karathane (0·2%) or bordeaux (4: 4: 50) or weekly applications of Phygon kept plants free from infection.—Tsungyeh Sugar Improv. Stat.

1955. Lopez, M., and Rivera, J. R.
Some aspects of sugar cane smut in the Visayas.
Sugar News, 1958, **34**: 478-83, bibl. 4.

Inoculation experiments have indicated that the following varieties are very susceptible to *Ustilago scitaminea:* H.44-3098, H.37-1933 and H.32-8560. The following are moderately susceptible: Badila, P.O.J. 2878 and L.C. 25/191. Tolerant or possibly resistant varieties include P.O.J. 2883, P.O.J. 2916, C.P. 29/116, N:Co.310, Phil. 48-15 and Phil. 49-32.

1956. Toohey, C. L.
Beetle damage in the south.
Cane Grs' quart. Bull., 1958, **22**: 60-1, illus.

Sugar cane, planted on newly broken grassland, was damaged by *Melanastes vulgivagus*, *Heteronychus sanctae-helenae* and *Ataenius duplopunctatus*, species that are not usually pests of cane. Control by BHC dust is suggested. When breaking up grassland, it would be best to keep the land fallow and free from weeds and grasses from spring until autumn before planting cane.

1957. Manjaiah, H. N.
A short note on the control of sugarcane stem borer.
Indian Sugar, 1958, **8**: 273-4, illus.

Experiments [not described here] have shown that in young cane fields the initial attack by stem borers can be largely prevented by a light earthing up at an early stage of growth. The small mouldboard fitted to a 5-tine cultivator which was used for earthing up is illustrated.

1958. Risco, S. H.
La utilización de *Paratheresia claripalpis* W., para el control biológico de *Diatraea saccharalis* Fabr., con especial referencia a los resultados obtenidos en los valles de Pativilca y Huaura. (**The use of *Paratheresia claripalpis* for biological control of *Diatraea saccharalis,* with special reference to the results obtained in the valleys of Pativilca and Huaura.)**
Rev. peru. Ent. agríc., 1958, **1**: 24-9.

Liberation of the parasite *P. claripalpis* in sugar plantations reduced infestation by the borer *Diatraea saccharalis* in the first locality by over 55% in 4 years, and in the second by 84% in only 3 months.

1959. Singh, S. H., Sandhu, J. S., and Arora, K. S.
Further studies on the control of termites in sugarcane fields of Punjab.
Indian Sugar, 1958, **8**: 331-6, bibl. 20.

Dipping setts in a specially prepared 0·5% mixture of Aretan and gamma-BHC resulted in significantly higher germination, number of shoots and yield of cane than were obtained in untreated plots, in both autumn- and spring-planted cane. Dips of BHC, aldrin and dieldrin had little or no effect.—Sugarcane Res. Stat., Jullundur.

1960. Muthuswamy, R.
Deterioration of quality of insecticide in the fertilizer mixture on storage.
Indian Sugar, 1958, **8**: 393-4, bibl. 2.

In order to ascertain the extent to which aldrin, added to a fertilizer mixture to control termite attack on setts, deteriorated in contact with the fertilizer, a mixture prepared 3–5 months previously was compared with a mixture prepared at time of planting and also with an application of fertilizer alone. The highest yield and complete termite control were only obtained with the freshly prepared mixture, although the stale mixture was superior to fertilizer alone.

1961. Lal, G.
White fly of sugar cane in north western Uttar Pradesh.
Indian Sugar, 1958, **8**: 445-50, bibl. 2.

A serious outbreak of *Aleurolobus barodensis* in the 1957–58 crop caused a marked reduction in sugar content. The heavy pest incidence is attributed to the following factors: an unusually large area under cane, a preponderance of ratoon crops, a lack of organic manure, a reduction of ammonium sulphate manuring leading to N shortage, and heavy rainfall in September.

1962. MATTHEWS, A. A.
Cockatoo damage.
M[UNGOMERY], R. W.
Carbide gun to control bird pests.
Cane Grs' quart. Bull., 1958, **22**: 40-1, illus., and 41.

The damage done by cockatoos to sugar cane is described. Varieties Q.50, 56 and 58 are known to be susceptible. Phosphorus poison placed under the husks of whole maize cobs tied to the cane is fairly effective. The second article describes a trial with the "Exid" bird scarer, which has given promising results.

Tea.

(*See also* 1982q, r, u, y, 1983g, m.)

1963. LAINS E SILVA, H.
Chàzicultura em Java. (**Tea cultivation in Java.**)
Mem. Sér. Agron. trop. Minist. Ultramar **2**, Lisbon, 1956, pp. 226, bibl. 215, illus.

This detailed and well illustrated work is divided into sections covering: (1) climate and soils, (2) the tea plant, including propagation by cuttings and by grafting, (3) establishment of plantations, (4) maintenance, including nutrition, shading, harvesting, and disease and pest control, and (5) technology.

1964. TEA RESEARCH INSTITUTE OF CEYLON.
Annual Report of the Tea Research Institute of Ceylon for the year 1957, being *Bull.* **39**, 1958, pp. 63.

Progress is reported on the following: *Chemistry:* leaf biochemistry, effect of soil pH and of alternate wetting and drying on mineralization of organic matter. *Technology:* Clones 2024 and 777 continued to produce very good quality tea and the blend was even better. *Physiology:* the results of numerous experiments on vegetative propagation are reported, and there are notes on prepruning trials, studies of bush characteristics and yield, and on long term experiments on manuring, plucking and pruning. *Pathology:* blister blight, red rust, wood rot, phloem necrosis, nematode control by fumigation and by planting marigolds. *Entomology:* control of lygus bug, termites, tea tortrix, green bug, nettle grub (by "wilt" disease virus), mites (including tests of acaricides) and shot-hole borer.

1965. INDIAN TEA ASSOCIATION, TOCKLAI.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experimental Station for 1957, [1958], pp. 243.

Reports on the progress of a large number of investigations include the following: *Physico-Chemistry:* Long term effects of manurial treatments on soil N status, leaf analysis studies, effects of prolonged manurial treatment on K/P status of the tea plant and of continuous ammonium sulphate treatment on leaf Ca and Mg, studies of P uptake by a green crop and of Cl uptake by tea. *Botany:* Tea systematics, practical applications of the phloem index, development and testing of biclonal progenies, effect of shade on green/dry weight relationship. *Agriculture:* Some 50 experiments are in progress concerned chiefly with manuring, shade, pruning and plucking. N continued to produce higher yields in mature tea, whereas P and K were beneficial in young tea only. Responses to urea, as compared with ammonium sulphate, have fallen off over the last 6 years. Organic manures were beneficial at planting time. *Plant Pathology:* Field trials of acaricides, insecticides and fungicides, eelworm investigations. Crag Fungicide No. 974 was ineffective against the commoner root diseases. *Biochemistry:* Fundamental studies on liquor characters and chemical differentiation between forms of tea and other *Camellia* spp. *Engineering:* Mechanical harvesting and pruning. The report also contains 4 separate papers as follows: Measures of the tea bush in agricultural trials, by W. Wight and L. R. Saikiah, pp. 42-57, bibl. 7; Selection policy in tea estates of north-east India, by W. Wight, pp. 58-68, bibl. 7; Nature of the plucked tea shoot conditioned by shade and manure, by D. N. Barua, K. N. Dutta and B. N. Gogoi, pp. 69-75, bibl. 1; Symptomatology and etiology of the tea flower disease, by V. Agnihothrudu, pp. 153-67.

1966. WHITEHEAD, C.
The vegetative propagation of tea on the lowlands of Malaya.
Malay. agric. J., 1958, **41**: 79-87, bibl. 7, illus.

Difficulties experienced in Malaya in propagating tea from cuttings have been largely overcome, and a detailed description is given of a satisfactory technique now in use to raise clonal material. It depends for success on the close control of atmospheric humidity during both rooting and hardening off. To achieve this the propagating pits are covered either by bracken fronds, which are moistened periodically, or by polythene, and the rooted plants, set in baskets or veneer tubes, are hardened off in frames with polythene covers. Among other points described are the cuttings themselves, which consist of 2 nodes with the lower leaf removed. The rooting medium consists of 2 parts medium loam, 1 part well-rotted sawdust and 1 part sharp sand. Over this medium is spread a ¼-in. layer of sharp sand, and, as holes are made for the cuttings, some of this sand slips down and surrounds their cut ends.

1967. CHUH, C.-M.
A preliminary communication on experiments in sowing green manure crops in tea plantations during winter. [Chinese.]
Ca-e, 1957, No. 1, pp. 16-22, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,835.

In trials with 18 green manure crops in tea plantations on red soil the highest amount of green matter was produced by *Vicia villosa* followed by *Pisum sativum* and *V. sativa*. While the yield of *Trifolium repens* was low, it grew well. The growth of other species was poor. The green manure crops increased the soil moisture content.

1968. Daraselija, M. K.
The problem of nitrogen in tea plantations in the light of lysimetric observations. [Russian.]
Bjul. Vses n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 4, pp. 3-21, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,832.

In red soils, as a result of the long-term cultivation of tea, changes occur in both their physical and chemical properties. The content of organic compounds increases (by 3% in 25 years) due to fallen leaves and prunings, while mineral losses are caused by rain, especially where deep cultivation and mineral fertilization are practised. The losses of Ca, Cl, SO_2 and Al are particularly great, while those of P and K are insignificant. Leaching of N is sharply increased by cultivation especially at high rates of application. A mean maximum of 300 kg./ha. N is recommended to ensure high yields.

1969. Feh, D.-C., and Hu, C.-L.
Trials on the fertilization of tea plants in pots. [Chinese.]
Ča-e, 1957, No. 1, pp. 23-7, from *Ref. Ž.* (*Biol.*), 1958, No. 4, Abstr. 15,836.

In the early stages of development tea does not respond to fertilizers. During the first year no N is required but in the second N becomes essential. Organic fertilizers have a favourable effect on growth at all times, and NK is better than NP. Raising seedlings in pots avoids injury at transplanting.

1970. Sakato, Y.
Recent advances in tea chemistry in Japan.
Proc. Sympos. Phytochem., Kuala Lumpur, 1957, pp. 168-72, bibl. 48.

In Japan, where large amounts of N fertilizers are commonly applied to tea, a positive correlation has been found between the total N in manufactured tea and its quality. In different kinds of tea the total N may range from 3·5 to 7·0%. Many amino-acids and amides have been identified, the most prominent of these being theanine. Tabulated data show that the content of each of these nitrogenous compounds may vary considerably over comparatively short periods of growth. In the case of theanine successive pluckings during May showed a decline in content in unshaded leaves but an increase in content in shaded leaves. Investigations on other components of tea leaves are reviewed briefly.—Res. Inst. Tea Ind., Kyoto.

1971. Roberts, E. A. H., Wight, W., and Wood, D. J.
Paper chromatography as an aid to the taxonomy of *Thea* camellias.
New Phytol., 1958, **57**: 211-25, bibl. 27.

Triglycosides of quercetin and kaempferol in tea shoots were found only in the true China type (*Camellia sinensis* proper). In Assam tea (*C. sinensis* var. *assamica*) a "southern" type was distinguishable from the main type by slight morphological differences and by the presence of an unidentified phenolic substance designated IC. Strong similarity in chemical composition was noted between *C. reticulata* and *C. pitardii*, also between *C. sinensis* and *C. taliensis*. Polyphenols and other substances detected in 10 non-*Thea* species of *Camellia* are listed.

1972. Su, T.
A preliminary report on the paper chromatography of the catechins of Lung-Chin tea leaves. [Chinese, with English summary ⅓ p.]
Acta bot. sin., 1958, **7**: 153-6, bibl. 12.

The following catechins have been tentatively identified in the fresh leaves of Lung-Chin tea: m-digallic acid, l-epigallocatechin, l-epigallocatechin gallate, l-epicatechin gallate, l-epicatechin, gallic acid, dl-catechin, catechin α-gallate and dl-gallocatechin. In addition, three other spots not previously reported by other workers were observed. One of these is probably a gallocatechin or a gallate of some other polyphenol and another may be an organic acid.

1973. Popov, V. R.
The polyphenoloxidase activity of tea shoots during growth and processing. [Russian, with English summary 7 lines.]
Biohimija, 1958, **23**: 856-61, bibl. 19.

A study of polyphenoloxidase activity in growing tea shoots has shown that the younger the leaf the more active is the enzyme and the greater the percentage of its soluble form. A marked change in polyphenoloxidase activity occurred during manufacture. In withered shoots the activity of the soluble form of polyphenoloxidase increased. An insignificant reduction of total polyphenoloxidase activity took place during fermentation, but the major part of the soluble polyphenoloxidase was bound to the oxidation products of tannin compounds. The bound enzyme did not lose its activity.

1974. Das, G. M.
Buprestid root-borers of young and nursery shade plants.
Two and a Bud, 1958, **5** (3): 13-14.

Dieldrin mixed with the soil in nursery beds or when planting out is suggested as a likely prophyllactic against the root borer *Sternocera aurosignata*, which attacks *Albizzia* shade trees.

1975. Gokhale, N. G., and others.
Effects of termite activity on the chemical properties of tea soils.
Sci. and Cult., 1958, **24**: 229, bibl. 5.

Termite activity raised the pH, increased K and Ca contents but reduced the N content. The most affected soil sample was taken from inside tea stems attacked by *Microcerotermes* sp.—Tocklai exp. Stat., Cinnamara, Assam.

Sundry crops.

(*See also* 1982 l.)

1976. Jackson, G. C., and Pennock, W.
Fruit and vitamin C production of five- and six-year-old acerola trees. [Spanish summary 18 lines.]
J. Agric. Univ. P.R., 1958, **42**: 196-205, bibl. 5.

Fruiting records were kept for 2 years on 163 trees representing 10 clones of acerola, *Malpighia punicifolia*. In each year the trees bore fruit during 5 well-defined cropping periods. The first crop was produced in February over a period of about 1 week; subsequent crops matured over longer periods, until the fifth, produced in October, was produced over a period of 4 weeks. Interspersed with the cropping periods were resting periods, which declined from 16 weeks before the first crop in February to 2 weeks before the last crop in October. Calculations based on the weighted mean yields of the clones suggest that a commercial orchard in Puerto Rico might be expected to yield about 10 tons of fruit per acre per annum containing about 435 lb. of vitamin C. The most productive clone, B15, yielded fruit and vitamin C at rates that were over twice as high as these estimates. For the production of fruit for fresh fruit consumption the clone Florida Sweet (K 7) was outstanding.

1977. Rao, V. N. M., Rao, I. K. S., and Rao, P. S.
A note on side-grafting of cashew *(Anacardium occidentale* Linn.)
Indian J. agric. Sci., 1957 (issued 1958), **27**: 451-2, bibl. 3.

Side grafting was successfully accomplished by placing moist moss above and below the union and covering the whole with Alkathene 100-gauge film. Up to 70% take was obtained, the best months being February to May.—Cent. Cashewnut Res. Stat., Mangalore.

1978. Rao, V. N. M., and Hassan, M. V.
Studies on the vegetative propagation of cashew *(Anacardium occidentale* Linn.) Further studies on air-layering.
Indian J. agric. Sci., 1957 (issued 1958), **27**: 453-65, bibl. 22.

Trials on air-layering of cashew are reported [for work on inarching see *H.A.*, 28: 4152]. In trees below 10 years, the shoots rooted earlier than those in trees 20 years old and more. In one-year-old seedlings rooting commenced within 22 days, and it was possible to separate the layer from the parent tree within 35 days. Cincturing (ringing) at the node was found to induce quicker rooting than cincturing half an inch above or below the node. Application of growth regulating substances such as Seradix A gave indications of higher success, larger numbers of roots and better rooting in the months of June and July, when the response was poor without their use. Among 8 different rooting media, wood shavings, coconut coir husk, coir husk dust and sand proved to be the best, while material which tended to become sticky proved unsuitable. Among 5 gauges of Alkathene film tested 100-gauge proved the cheapest and best. [From authors' summary.] —Cent. Cashewnut Res. Stat., Mangalore.

1979. Blommaert, K. L. J.
Stem cuttings can be obtained more easily with new method.
Fmg S. Afr., 1958, **34** (9): 10-11, illus.

Cuttings of 2 local commercial guava varieties, made from the current year's growth, were trimmed to 2 nodes, leaving 2 leaves, each of which was halved. Rooting was in sand under intermittent mist. Softwood cuttings given a quick-dip treatment in 0·4% IBA before insertion showed 75–90% rooting, but the rooting of semi-hardwood cuttings was poor.—W.P. Fruit Res. Stat., Stellenbosch.

1980. Viado, G. B., and Banaag, A. F.
Control of lanzones bark borers with organic insecticides.
Philipp. Agric., 1958, **42**: 163-72, illus.

Larvae of *Praxinoxena* sp. and *Cossus* sp., of which few were present, were best controlled by endrin and EPN. Endrin resulted in the greatest increase in fruiting and yield, followed by EPN, but in terms of reduced tunnelling and incidence of larvae EPN was the best of several insecticides tested.

1981. Evréinoff, V. A.
Notes sur *Hovenia dulcis* Thunberg. (**Notes on *Hovenia dulcis*.**)
J. Agric. trop. Bot. appl., 1958, **5**: 487-90, bibl. 20.

This tree is native to mountainous S.E. Asia and is common in China. It is rarely found below 1,000 m. in altitude. It is decorative in appearance, and the fleshy peduncles of the flowers are edible and esteemed where the plant is known. The composition is stated; and they contain 48% of sugars when dried. The flavour is pleasant, recalling sweetmeats with an after-taste of melon. The peduncles ripen at the end of summer. The tree has been introduced into California, S. France and elsewhere; it is a calcifuge and is sensitive to drought. Seed germination is poor and it is difficult to raise from cuttings.

Noted.

1982.

a Acharya, R. C., Prasad, S. K., and Khanna, K. L.
Studies in sampling technique. IX. Estimation of stalk-basis incidence of sugarcane borers in a field.
Proc. Indian Acad. Sci., Sect. B, 1958, **48**: 259-66, bibl. 9.
Cluster sampling much less efficient than unrestricted or stratified random sampling. [For Part VII, see *H.A.*, 28: 1997b.]

b Anon.
Lutte chimique contre les principaux ennemis et les principales maladies du cacaoyer. **(Chemical control of the chief pests and diseases of cacao.)**
Circ. Cent. Tech. Agric. trop. **58/1,** reprinted in *Café, Cacao, Thé*, 1958, **2**: 68-79, bibl. 2, illus.
Concise notes on current recommendations.

c Anon.
Rooting habit.
Plant. Bull. R.R.I.M., 1958, No. 39, pp. 120-8, illus.
The root systems of young hevea trees described and photographed from excavations.

d Anon.
Planting recommendations, 1959-60.
Plant. Bull. R.R.I.M., 1959, No. 40, pp. 3-10.
For rubber in Malaya, including brief notes on some of the recommended clones.

e Antener, I.
Die Vitamine der B-Gruppe der Kakaobohne. **(The vitamins of the B group in cacao beans.)**
Mitt. Lebensm. Hyg., Bern, 1958, **49**: 127, 139, bibl., from abstr. in *Gordian*, 1958, **58** (1391): 20.

f Auboin, P.
Magnésie et fruits tropicaux. **(Magnesium and tropical fruits.)**
Fruits d'Outre Mer, 1958, **13**: 475-9, bibl. 20.
A review, with data concerning avocadoes, bananas, citrus, mangoes and pineapples.

g Brown, E. S.
Injury to cacao by *Amblypelta* Stål (Hemiptera, Coreidae) with a summary of food-plants of species of this genus.
Bull. ent. Res., 1958, **49**: 543-54, bibl. 18, illus.
Damage caused by 2 species in S.W. Pacific described.

h Champion, J., and others.
Les sols de bananeraies et leur amélioration en Guinée. **(The soils of banana plantations and their improvement in Guinea.)**
Fruits d'Outre Mer, 1958, **13**: 415-62.
Detailed physical, chemical and biological investigations.

i Chopra, S. K.
Red rot disease in sugar cane.
Indian Sugar, 1958, **8**: 269-71.
Symptoms and control, and notes on a control campaign being organized in 3 States.

j Cornwell, P. B.
Movements of the vectors of virus diseases of cacao in Ghana. I. Canopy movement in and between trees.
Bull. ent. Res., 1958, **49**: 613-30, bibl. 17.
Nymphs of *Pseudococcus njalensis* show considerable mobility.

k Cunningham, R. K., and Lamb, J.
A cocoa shade and manurial experiment at the West African Cocoa Research Institute, Ghana. I. First year.
J. hort. Sci., 1959, **34**: 14-22, bibl. 12.
Details of work reported in *H.A.*, 28: 4063.

l El Khadem, H., and Mohammed, Y. S.
Constituents of the leaves of *Psidium guaijava* L. Part II. Quercetin, avicularin, and guaijaverin.
J. chem. Soc. Lond., 1958, pp. 3320-3, bibl. 6.
Three compounds possessing antibacterial properties.

m Entwistle, P. F.
Mealybugs III—a brief review of previous attempts at control.
Ghana Fmr, 1958, **2**: 101-5, illus.
Mainly *Pseudococcus njalensis* on cacao. [For Part II, see *H.A.*, 29: 960n.]

n F.A.O.
Some aspects of the coconut situation.
F.A.O., Rome, 1956, pp. 66 (cyclostyled).
A survey of world production, trade and consumption.

o Fukunaga, E. T.
Coffee in El Salvador.
J. agric. Soc. Trin. Tob., 1958, **58**: 269-89.
Practices contrasted with those of Hawaii.

p Garot, A., and Subadi.
Memenggal (toppen) pohon karet muda. **(Heading back young rubber trees.)** [English summary 16 lines.]
Menara Perkebunan, 1958, **27**: 187-91, illus.
Topping young rubber trees at 2·5 m. is recommended.

q Goodchild, N. A.
From seed to production.
Quart. Circ. Tea Res. Inst. E. Afr., 1958, **1**: 57-9, 95-7.
Siting and planting a tea nursery; management and pruning of young transplants.

r G[reen], M. J.
Clonal selection schemes. 1. Basic programme for selection and programme. 2. Clonal trials and records. 3. Nucleus clones. 4. Field selection methods.
Ser. Tea Res. Inst. Tocklai **126, 127, 128** and **129,** 1958, pp. 2, 4, 2 and 3.
Advice to planters on how to select suitable clones and conduct field trials.

s Gupta, B. D.
Some friends of the sugarcane farmer. Pt. I. Parasites on the top borer, *Scirpophaga nivella* F.
Indian Sugar, 1958, **8**: 439-44, bibl. 10, illus.
The life histories, habits and economic importance of 4 parasites.

t Haarer, A. E.
Planting coffee in new areas.
World Crops, 1958, **10**: 445-7, illus.
A review of ecological requirements.

u Heath, E. D.
Aerosol spraying.
Two and a Bud, 1958, **5** (3): 8-10.
Features required in an ideal, portable, low-volume sprayer for use in tea.

v Imle, E. P., and Shrum, J. F., Jr.
Un centro de cuarentena vegetal para cacao en Florida. (**A quarantine centre for cacao in Florida.**)
Turrialba, 1958, **8**: 4-12.
A critical account.

w Jardim de Bettencourt, A.
A cultura do café em Moçambique. (**Coffee growing in Mozambique.**)
Rev. Café portug., 1958, **5** (18): 37-9.
A brief progress report on the first 5 years.

x Jordan Molero, F.
Especies y variedades de cafetos. (**Species and varieties of coffee.**)
Rev. Agric. P.R., 1957, **44** (2): 15-58, from abstr. in *Supl. bibl. Turrialba*, 1958, **8** (2): 7.
Botanical studies on *Coffea arabica*, *C. robusta* and *C. liberica*.

y Lains e Silva, H[élder], and Carvalho Cardoso, J.
Esboço da carta de aptidão agrícola de São Tomé e Príncipe. (**Outline description of the agricultural land-suitability map of São Tomé and Príncipe islands.**) [English abstract 2 pp.]
Reprinted from *García de Orta*, 1958, **6** (1): 61-8, bibl. 10, maps.
A preliminary study with reference to cacao, coffee, tea, hevea, oil palms and coconuts, etc.

z Lakshmikantham, M., and Suryanarayana, J. V. V.
Enter Co.997, exit Co.527.
Indian Fmg, 1958, **8** (7): 16, illus.
Co.997 is earlier maturing, heavier yielding and free from leaf-sheath spines.

1983.

a van der Linde van Sprankhuizen, J. C.
Ground covers in rubber plantations.
Menara Perkebunan, 1958, **27**: 211-19, [Indonesian version pp. 163-74], and reprinted in *Planter, Kuala Lumpur*, 1958, **34**: 669-80.
Types of cover crops, their establishment and maintenance.

b McCrae, D. J., Robinson, J. B. D., and Wallis, J. A. N.
Report on a short visit to the Kivu arabica coffee area of the Belgian Congo.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 245-7, 252, 273-5, 280.
General management including shade, mineral deficiencies, pest and disease control, processing.

c Malavolta, E.
La concimazione del caffè in Brasile. (**Manuring coffee in Brazil.**) [English summary 4 lines.]
Riv. Agric. subtrop. trop., 1958, **52**: 610-20, bibl. 13, illus.
With special reference to the principal soil types.

d Owen, W. L.
Fertilizing value of composting filter-cake muds.
Sugar J., 1958, **21** (3): 37-43, bibl. 15.
A review.

e Ribeiro (Filho), J.
Estudo preliminar sôbre a incidência do secamento de ponteiros ou "die back" em algunas variedades de cafeeiro (*Coffea arabica* L.). (**Preliminary study of the incidence of wither tip or die back in some varieties of coffee (*Coffea arabica*).**) [English summary ¾ p.]
Rev. Ceres, 1958, **10**: 413-21, bibl. 12.
Of the 10 varieties compared Mundo Novo was the most resistant.

f Rishell, C. G.
Agua necesaria para irrigar una hectárea de banano. (**Amount of water necessary for irrigating one hectare of bananas.**)
Agric. trop. Bogotá, 1958, **14**: 557-67.
Recommendations for Sevilla, Colombia.

g Roberts, E. A. H., and Myers, M.
Theogallin, a polyphenol occurring in tea. II. Identification as a galloylquinic acid.
J. Sci. Food Agric., 1958, **9**: 701-5, bibl. 10.
Including improved methods for extracting it from unprocessed leaf. [For Part I see *H.A.*, 25: 2252.]

h Rosero, J., Romero Sánchez, J. I., and Vélez, J.
Regiones cafeteras de Colombia. **(Coffee-growing regions of Colombia.)**
Rev. cafet. Colomb., 1958, **14**: 213-42, bibl. 14, illus.
Methods of planting, harvesting and processing.

i Satyabalan, K.
Coconut varieties of the Laccadive islands.
Coconut Bull., 1958, **12**: 303-6, illus.
Short notes on 3 varieties and their yields.

j de Silva, C. A.
Soil conservation, drainage and holing.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1958, **34**: 1-7, illus.
For rubber establishment on sloping land.

k Suárez de Castro, F.
Son perjudiciales las quemas? **(Is burning harmful?)**
Rev. cafet. Colomb., 1958, **14**: 245-9.
Generally beneficial when preparing land for coffee in the humid zone.

l Tekper, W. N.
Oil palm industry in Krobo.
Ghana Fmr, 1958, **2**: 92-4, illus.
Traditional methods briefly described.

m Thio Goan Loo.
Manufacture of black tea on a small scale (a semimicro method). [Indonesian summary ½ p.]
Menara Perkebunan, 1958, **27**: 259-67, bibl. 7, illus.
Details of a laboratory method for small samples.

n Uribe A., H., and Quiceno H., G.
Comportamiento de algunas progenies de *Coffea arabica* L., bajo diferentes condiciones de sombrío y fertilización. **(Behaviour of some *Coffea arabica* progenies under different conditions of shade and fertilizing.)**
Cenicafé, 1958, **9**: 121-4.
See *H.A.*, 28: 3075.

o U.S. Dep. Agric., Foreign Agricultural Service.
1958-59 coffee crop estimate increased; trade rising.
Foreign Agric. Circ. U.S. Dep. Agric. **FCOF 3-58,** 1958, pp. 11.
World exportable production estimated at 51 m. bags, total production 58·7 m.

p U.S. Dep. Agric., Foreign Agricultural Service.
World cocoa bean production expected to rise in 1958-59.
Foreign Agric. Circ. U.S. Dep. Agric. **FCB 4-58,** 1958, pp. 10.
To 847,000 long tons compared with 780,000 for 1957-58. 1957 was a record year.

q U.S. Dep. Agric., Foreign Agricultural Service.
World sugar production continues upward trend.
Foreign Agric. Circ. U.S. Dep. Agric. **FS 7-58,** 1958, pp. 6.
1958-59 centrifugal sugar production a record, estimated at 52·2 m. short tons.

r Venema, K. C. W.
Potash deficiency symptoms on sugar cane.
Potash and trop. Agric., 1958, **1**: 11-22, bibl. 43.
A review.

s Wallis, J. A. N.
Coffee seed issued by the Coffee Research Service.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 302-4.
Notes on principal varieties, including rust resistant types.

t Wijewardene, R.
Mechanisation on coconut plantations.
World Crops, 1958, **10**: 438-40, bibl. 5, illus.
A short review.

u Wilson, G.
Applying BHC at planting time.
Cane Grs' quart. Bull., 1958, **22**: 42-4, illus.
At 110 lb./acre controlled frenchi grubs and did not reduce germination.

v Wise, H.
Agricultural possibilities in Honduras.
Ceiba, 1958, **7** (1): 1-43, illus.
With notes on fruit and other crops grown in Honduras.

w Zafar, M. A., and Akhtar, M. I.
Papaya cultivation.
Agric. Pakist., 1958, **9**: 17-20.
Short notes on establishment and culture.

NOTES ON BOOKS AND REPORTS.

Books.

(*See also* 1325, 1636, 1709, 1717, 1767, 1771.)

1984. Boros, G.
Lexikon der Botanik mit besonderer Berücksichtigung der Vererbungslehre und der angrenzenden Gebiete. **(A dictionary of botany, with special reference to genetics and allied topics.)**
Eugen Ulmer, Stuttgart, 1958, 6½×4½ in., pp. 276, bibl. 43, DM. 12.

This handy little volume will be a great boon to all those who struggle professionally or for their pleasure with botanical terms in German, and no library should be considered complete without such an aid. In addition to the dictionary proper there is a useful appendix (pp. 264-276) of Latin and Greek radicals with derivations therefrom.

1985. British Weed Control Council.
Weed control handbook.
Blackwell, Oxford, 1958, 9×6 in., pp. viii+245, illus., 12s. 6d.

The title is somewhat misleading as this book is concerned solely with the use of chemicals, disregarding cultural and mechanical methods of weed control which are nevertheless still important, especially in the intensive cultivation of high-value crops.

A short introduction, dealing with the terminology, classification and formulation of herbicides and the general use of the more important compounds in Great Britain, prefaces the main section. The latter comprises one half of the book, and contains information and recommendations on individual formulations and their function in the chief fields of use. Selective herbicides are recommended for the more important horticultural crops, grouped under vegetables, fruits and flowers and ornamentals, and new trends in treatment are reviewed. There is also a chapter on lawns and sports turf and a section on aquatic weeds and algae.

The third part deals with types of machine, methods of application, problems of drift, mixing herbicides with insecticides and nutrients and the legal position of the manufacturer, user and public. Weeds and weed seeds form the subject of the fourth part, and legislation concerning noxious weeds and crop seed certification schemes are outlined. Under the heading "Approved and new herbicides" the final part gives lists of all approved commercial products, new compounds, technical terms, and all the more important common names and chemical abbreviations. There is a comprehensive table of products in which the materials are grouped according to their chemical composition. This handbook, with its excellent survey of a rapidly expanding subject, will be of great value to all concerned with weed control problems. E.U.

1986. Christopher, E. P.
Introductory horticulture.
McGraw-Hill, N. York, Toronto and London, 1958, 9½×6½ in., pp. 482, bibls, illus., 58s.

The simple title of this book could not be bettered. It is written primarily for the horticultural student in the Eastern States of the U.S.A., though it is likely to prove useful to any reasonably intelligent would-be horticulturist.

It is prefaced by statistics of horticultural production in different parts of the country, and the second to fifth chapters are concerned with the following general subjects: practical botany and physiology and their application to horticulture, climate ditto, soil ditto, propagation problems and plant growing structures, such as frames, etc. Next the author turns to vegetables, where he not only discusses general problems including those of irrigation and weed control, but also deals with the cultivation of individual common vegetables. Floriculture outdoors and indoors then receives attention, and this is followed by 3 sections on fruit crops divided into pome fruits, drupes and evergreens, and small fruits, considerable attention being paid to blueberry and cranberry cultivation and harvesting. Later chapters contain useful facts and suggestions regarding landscape gardening, nurseries and shrubs, and on abnormalities due to environment and to pests and diseases. The last named are only briefly considered. The book ends with discussions on storing and marketing and the requirements of showing and judging. D.A.

1987. Hey, G. L., and Marshall, K.
The control of pests and diseases in agricultural and horticultural crops.
Vinton & Co., London, 1958, 7½×5 in., pp. 172, illus., 12s. 6d.

As the title of this small book indicates the text covers a very wide field; for example, eight chapters are devoted to the pests and diseases of farm and garden crops, of fruits and hops, of glasshouse crops, and of mushrooms. Other chapters discuss briefly pest and disease control by cultural, mechanical and biological methods, insecticides, fungicides, soil sterilizers and seed dressings. Brief mention is made of the use of spraying and dusting machines for outdoor use, the application of fungicides under glass, and also of low volume spraying. The control measures recommended for agricultural and horticultural crops are adequate and up-to-date, but in many cases greater attention to detail and alternative suggestions for control would have materially enhanced the value of the book. The same criticism applies to the paragraphs relating to the life-cycles of the pests. These are too brief to be of much value to the keen student.

The four plates of photographs illustrating selected pests and diseases and the injury caused by them are not up to present-day standards, but the two showing a tractor-drawn crop sprayer and various kinds of hand spraying and dusting machines indicate the progress made in providing efficient spraying equipment in recent years. A list of the common and scientific names of the pests and diseases forms a useful appendix to the book. For the modest price of twelve shillings and sixpence, a great deal of up-to-date information is packed into its 172 pages, and the book will be regarded as a "must" by those concerned with the control of pests and diseases of agricultural and horticultural crops. A.M.M.

1988. Lucas, G. B.
Diseases of tobacco.
Scarecrow Press Inc., New York, 1958, 9×5½ in., pp. 498, bibls, illus., $10.00.

Books on tobacco diseases are few and far between, and this new one by an expert from North Carolina should have a great welcome from tobacco growers all over the world.

A preliminary chapter gives brief statistics of tobacco areas and production throughout the world. The figures given for the year 1955 show the U.S.A. to be easily the biggest producer with 2,195,788 lb.; China comes next with 1,610,000 lb., and honourable places are occupied by the Federation of Rhodesia and Nyasaland with 151,725 lb. and Canada with 134,840 lb. This is followed by 3 chapters on plant beds, on rotations in relation to disease and on breeding for disease resistance.

Then comes the real meat. The book is wide in scope and "disease" is made to cover also malnutrition, physiological injury due to climate, and genetic abnormalities. The whole is contained in 44 chapters, each with illustrations and a useful list of references. Those diseases which are of particular importance to the North American grower receive pride of place and maximum attention. This is generally bestowed in most orderly fashion on etiology of organism concerned, host-parasite relationship, environmental factors and control. The nematodes, especially the endoparasites of the *Meloidogyne*, *Pratylenchus* and *Ditylenchus* groups, are dealt with in detail, as are a very large number of fungus parasites, especially those causing black shank, black root rot, damping off and sore shin. Bacterial diseases occupy 60, and virus diseases 66 pages. The parasitic plants broomrape, witchweed and dodder and their control also receive attention. The many illustrations and extensive bibliographies are important features of this useful book. D.A.

1989. Němec, B. (Editor).
Pestovanie marhúl' a ich predčasné hynutie. **(The cultivation of apricots and their premature decline.)** [Russian, German, French and English summaries.]
Vydavatel'stvo Slovenskej Akadémie Vied, Bratislava, 1958, 9½×6½ in., pp. 318, bibls, illus., Kčs. 27.50.

This book is a symposium comprising 33 papers written by many authors, mostly Czechoslovak but including some foreign specialists. The papers are in Slovak and Czech and provided with Russian, German and in some cases French and English summaries. After an introduction by the editor and a survey of opinions on the apoplexy of apricots, the articles are grouped under 6 main headings. In the first group the cultivation of the crop and problems relating to it in 7 European countries and its homeland, China, are described. Next, general and local problems of rootstocks and methods of propagation are discussed. In chapter four, breeding, varieties, identification, biology, orchard management and pruning are covered. Under the heading "harmful agents" 9 short papers are presented which discuss pests, diseases and other factors in relation to apoplexy. The last chapter gives a brief description of important apricot growing areas in Czechoslovakia.

1990. Porter, H. K. (Editor).
The biological action of growth substances.
Cambridge University Press, London, 1957, 10×6½ in., pp. 344, bibls, illus., 55s.

This volume contains the communications made at the eleventh Symposium of the Society for Experimental Biology. Amongst the 19 papers published, the following are of direct or indirect horticultural interest: A reassessment of the problem of apical dominance, by F. G. Gregory and J. A. Veale; The physiological action and biological importance of germination inhibitors, by M. Evenari; Auxins and the mechanism of root growth, by H. Burström; Hormonal aspects of fruit development in higher plants, by L. C. Luckwill; Chemical regulation of growth and organ formation in plant tissues cultured *in vitro*, by F. Skoog and C. O. Miller; The effects of some microbial metabolic products on plant growth, by P. W. Brian.

1991. Prockter, N. J.
Simple propagation.
Collingridge, London, and Transatlantic Arts Inc., Florida, 1958, 7½×5 in., pp. 152, illus., 10s. 6d.

This compact little book, in which so many aspects of propagation are dealt with so efficiently, deserves to be thoroughly well soiled by grubby thumbs. Clearly written, truly concise, it is certainly "simple". Yet nothing essential is overlooked; propagation by seed, division, layers, cuttings and grafts of many kinds is adequately described and

supported by over a hundred excellent photographs. There are specific instructions for propagating over two hundred and fifty trees, shrubs, herbaceous and alpine plants. When we noted the first edition [*H.A.*, 20: 3406], we had nothing but good to say of it, and this new edition, providing additional information on the newer ways of air layering, mist propagation and other delights, has also maintained its power to please. If ever mislaid, we suggest it will be found either in the garden jacket pocket or on the potting shed bench.
R.J.G.

1992. Ruhland, W., and others (Editors).
Handbuch der Pflanzenphysiologie. Band IV. Die mineralische Ernährung der Pflanze. **(Encyclopaedia of plant physiology. Vol. 4. The mineral nutrition of plants.)**
Springer-Verlag, Berlin, Göttingen and Heidelberg, 1958, 10×6½ in., pp. xx+1210, bibls, illus., DM. 298.

The subjects in this volume are mainly dealt with in German. They include: Plant ash; Methods of determining the mineral requirements of plants (with a section in English on tracer methods with isotopes); Sources of mineral matter (with English sections on the soil, the atmosphere, and uptake of minerals); Translocation of minerals; Physiological action of minerals (with English sections on enzyme systems and minor elements); Salt losses and redistribution of salts in higher plants (in English); The importance of mineral substances for colonization of soil by plants; Mineral nutrition in crop production (with English sections on nutritional requirements of crop plants, including vegetables, fibre plants, tobacco, sugar cane, hops, deciduous fruit trees and bushes, citrus, figs, coffee, tea, bananas and pineapples, also of forest plants); The importance of micro-organisms for the cycles in mineral evolution. [For other volumes in this series see *H.A.*, 27: 975 and 4008, also 28: 3197 and 3198.]

1993. Saunders, H. N.
A handbook of West African flowers.
Oxford University Press, London, 1958, 7½×5 in., pp. 124, illus., 5s.

This is a most useful and attractive little book, which will be greatly appreciated by all who live in West Africa and wish to identify the commoner flowers of the countryside. In it are described some 364 species, and many of these are illustrated by small but precise line drawings. The descriptions are succinct and are couched in simple botanical terms unlikely to deter those who are interested in nature study. A short glossary is provided, and there is also a neat artificial key to aid identification. Trees and economic crops have for the most part been excluded.

There is a great need for this type of nature study book in countries where the native plants are not well known by the vast majority of the inhabitants, and where the rapid spread of education is creating a healthy desire to recognize and appreciate the wild life of the countryside. This book helps to bridge the gap between vernacular names known only to village people and the great floras of the botanists. Costing only 5 shillings, it will bring satisfaction and pleasure to many. G.E.T.

1994. Searle, S. A., and Smith, L. P.
Weatherwise gardening.
Blandford Press, London, 1958, 8½×5½ in., pp. 246, bibl. 2, illus., 21s.

The laudable object of this book is to make the gardener realize some of the facts put at his disposal by the meteorological office and to apply the consequences in the cultivation of his own garden. The facts disclosed apply to the British Isles, but the implications have much wider scope. In Part 1 the effects of climate on the garden are discussed, including seasonal effects and the influence of sun, rain, wind and temperature phenomena. Next, scientific aids to weather forecasting are discussed and how the gardener can make use of them. In Part 3 is shown what effects garden structures and design and gardening operations such as using frost covers, digging, hoeing, mulching and watering can have on the climate within the garden. And lastly the effects of various environmental factors upon the growth, flowering, etc., of garden plants are examined, and recommendations are made on how to benefit from a knowledge of them.

It is a most thought-provoking and valuable book and a determined study of it cannot fail to be useful. D.A.

1995. Stakman, E. C., and Harrar, J. G.
Principles of plant pathology.
Ronald Press, New York, 1957, 9×6 in., pp. 581, bibls, illus., $8.00.

Whereas the first part of this book is likely to be of more interest to the plant pathologist as such, in the latter part, pp. 301 onwards, the authors are concerned with the principles which directly affect the cultivator and his actions. Here they deal with the effect of environment and nutrition on disease development, briefly with the particular diseases of some major crops including sugar cane, bananas, coffee, citrus, cacao, coconuts and rubber, with transit and storage diseases, with quarantine and international plant protection regulations, with the effect of cultural practices on disease control, with chemical control including the use of antibiotics and hormone herbicides, and with resistant varieties. Finally, looking to the future, they suggest that the use of chemicals, radiations and other mutagenic agents to cause chromosomal and gene changes offers much scope for the production of long-enduring, disease-resistant varieties. They believe systemic protection may become common. They note the existence of beneficial products in certain plant pathogens as in ergot and the *Gibberella* fungi.

1996. Stout, G. J.
Successful truck farming.
Macmillan, New York, 1958, 8½×5½ in., pp. 270, $6.25 or 44s.

This stimulating book tells you, not how to grow onions or potatoes or asparagus or sweet peppers, but, long before you propose to do any of these things, what the factors are which are going to influence the successful growing of these and other vegetable crops. The author, writing with special reference to the U.S., deals with the different conditions, most of them ecological, which are responsible for the desirability or not of setting up market gardens or vegetable farms for the purpose of profit. Thus he deals in turn with rainfall and humidity, irrigation, soils, root systems, temperature factors, frost effects, insects and diseases in relation to vegetable geography, winds and other climatic factors, labour problems, mechanization, transport, refrigeration and storage, effects of government regulations, and marketing. He suggests that the future may well depend on improvements in the use of hormones, irrigation technique, breeding, temperature control and harvesting machinery, and he indicates in what directions such improvements are likely to lead. D.A.

1997. Tempany, H., and Grist, D. H.
An introduction to tropical agriculture.
Longmans, Green & Co., London, New York, Toronto, 1958, 9×6 in., pp. xvi+347, bibl. 211, illus., 40s.

This new conspectus of tropical agriculture was initiated by the late Sir Harold Tempany and is a fitting memorial to his very long experience and deep knowledge of the subject. His manuscript has been augmented and brought fully up to date, and as a survey of current knowledge and recent trends this book is most impressive. It is not, however, in any sense a text-book; it does not deal with individual crops and is not, therefore, the book to consult on matters of detail in the growing of a particular crop or the management of a particular breed of livestock. On the contrary, it provides what is so difficult to obtain from the ordinary text-book, namely a panoramic view of the whole subject. This is done in 19 chapters, each of which is in fact a comprehensive review of one aspect of tropical agriculture. The first 5 chapters describe the tropical background—climate, soil (an admirable chapter by Dr. H. Greene), types and development of agricultural systems and research. Agricultural practice is then dealt with under subject headings—soil conservation, fertilizers, irrigation and drainage, pests and diseases, processing and storage and so on. Finally, in a most valuable section for the political or administrative reader, the problems of marketing, land tenure and finance are surveyed.

It is inevitable that, if such a book is not to have the dimensions of an encyclopaedia, the treatment of some aspects must be rather superficial; and, though it may be unreasonable to expect a more detailed approach, it is difficult not to feel disappointed by the unavoidable scantiness of some sections. It is also possible to criticize the balance of emphasis; animal husbandry, for instance, receives rather meagre attention, and progress and problems in the Commonwealth are understandably given greater prominence than those of other tropical regions.

This book will prove of particular value to administrators in all tropical regions, especially those who are less well acquainted with agricultural conditions and achievements in other lands. It should be read by all who intend to become agricultural officers or to undertake agricultural development projects in the tropics. It may be confidently recommended to all thoughtful people, whose interests lie in any branch of tropical agriculture and who seek an authoritative survey of the whole subject. It is well printed and has a number of good illustrations. There is a useful bibliography and the book is well indexed. At £2, in these days, its purchase will be money well spent. G.E.T.

Annuals and reports.

(*See also* 1934-1937, 1964, 1965.)

1998. Boskoop (Dorsman, C.).
Jaarboek Proefstation voor de Boomkwekerij te Boskoop 1957. (**Yearbook of the Boskoop Tree and Shrub Nursery Experimental Station for 1957**), pp. 106, illus.

Some of the research reports have been abstracted separately in the Floriculture and Weed control sections. Other reports are included on: *Propagation:* by cuttings of *Prunus cistena*; the use of boxes for rooting cuttings; green wax for covering unions; grafting birch, blue spruce, beech and oak under glass; high and low grafting of lilac varieties; rootstock studies on *Cotoneaster*, *Rosa*, *Prunus* and *Syringa*. *Diseases and pests:* wilt of *Clematis* (probably caused by *Phytophthora cactorum*); control of *Cercospora handelii* on rhododendrons by an organic mercury compound; control of *Diplocarpon rosae* by 0·3% zineb; control of rose mildew by 9 weekly sprays of 0·1% karathane; the incidence of leaf spot on lilac plants grafted on *Syringa* and *Ligustrum* spp.; selection of virus-free plums, peaches, almonds and peonies. *Breeding:* of many woody ornamentals; and the artificial induction of mutations.

1999. CLIFTON, C. E., RAFFEL, S., AND STARR, M. P. (Editors).
Annual review of microbiology, Volume 12. Annual Reviews Inc., Palo Alto, California, 1958, 9×6 in., pp. 581, bibls, $7.00 in U.S.A., $7.50 elsewhere.

Among the reviews in this volume are: Antibiotics in the control of plant disease, by W. J. Zaumeyer; Masked virus infection in plants, by E. M. Hildebrand; and Plant tissue cultures open a botanical frontier, by A. J. Riker and A. C. Hildebrandt.

2000. COLONIAL PESTICIDES RESEARCH UNIT, ARUSHA.
Progress Report, April, 1958, to September, 1958, **23,** 1958, Arusha, Tanganyika, pp. 17 +appendix.

Progress is reported on the following studies: control of *Pseudotheraptus wayi* on coconuts, persistence of parathion on coffee, application of copper to coffee, black pod disease of cacao, arboricidal trials on *Grevillea robusta* (*Armillaria mellea* infection of tea subsequent to cutting out *Grevillea* windbreaks causes serious damage), use of herbicides in pyrethrum, coffee and seed beans.

2001. COMMONWEALTH ECONOMIC COMMITTEE.
Fruit. A review of production and trade relating to fresh, canned and dried fruit, fruit juices and wine.
[*Publ.*] *Commonw. Econ. Cttee*, 1958, pp. 188, H.M.S.O. Lond., 5s.

This review deals with both temperate and tropical fruits. There are also 4 appendices dealing with fruit consumption levels, fruit utilization, government measures affecting United Kingdom fruit imports, and import duties and trade regulations.

2002. DIRECTIE VAN DE LANDBOUW, THE HAGUE.
Tuinbouwgids, 1959. **(Horticultural guide for the Netherlands, 1959.)**
The Hague, Netherlands, 1958, 9×6 in., pp. 764, illus., fl. 8.50.

More illustrations have been included in the 16th edition of this valuable reference book for professional horticulturists, and a new crop of articles is included in the cultural sections. There is also information on house plants and herbaceous plants for the amateur gardener in the final section.

2003. EAST AFRICA HIGH COMMISSION.
Regional Research Programmes 1958-59, Agriculture, Animal Industry, Animal Disease, Forestry.
Govt Printer, Nairobi, pp. 83, Sh. 10.

In this first attempt to combine in one volume the programmes of current research in East Africa the coverage extends to Government Departmental research and to that of commodity research stations, commercial firms and Makerere College. Revised editions from time to time are promised. Of particular interest to horticulturists are pp. 16–30, which deal with research on bananas, cashews, citrus, pineapples, other fruits, vegetables, castor beans, coconuts, sesame, coffee (arabica and robusta), cacao, tea, fibres (especially cotton and sisal), sugar cane, tobacco, cloves, pepper, ylang-ylang, geranium, pyrethrum, derris, artemisia and crop pests. A short section is devoted to weed control work.

2004. GUATEMALA, MINISTERIO DE AGRICULTURA.
Servicio Cooperativo Interamericano de Agricultura. Informe Anual, 1957. **(Ministry of Agriculture. Inter-American Co-operative Service for Agriculture. Annual Report 1957),** pp. 192, illus.

Beans: Regional varietal and fertilizer trials. *Tea:* Production proved too costly to justify expansion. *Hevea:* Nursery management; cover crops; pest control; breeding and selection for resistance to South American leaf blight (*Dothidella ulei*); identification of clones by seed characteristics; mixed cropping with coffee or cacao. *Fruit propagation:* Work in progress at various centres on stone fruits, avocado pears, citrus, persimmons and several tropical fruits. [See also separate abstracts on tomatoes, cacao and coffee.]

2005. INSTITUUT VOOR PLANTENZIEKTENKUNDIG ONDERZOEK, WAGENINGEN.
Jaarverslag 1957. **(Annual Report for 1957 of the Institute for Plant Pathological Research, Wageningen.)** [English summary 7½ pp.], 1958, pp. 162, illus.

The following are some of the results reported by the various sections: *Entomology. Strawberry:* control of *Pentatrichopus fragaefolii* in virus studies, and control of *Tarsonemus* sp. by endrin. *Apple:* the build-up of resistance of green apple aphis and red spider to organic phosphorus materials, and the control of tortrix species, *Orthosia* species, and *Bryobia rubrioculus. Raspberry:* control of *Macropsis fuscula*, the vector of stunt virus. *Vegetables:* control of *Brevicoryne brassicae* on brussels sprouts by organic phosphorus compounds, control of carrot fly (*Psila rosae*) by seed or soil treatments, control of pea thrips by parathion, and preliminary studies on gall midges injurious to osier beds. *Mycology. Apple and pear:* fungicides for curative control of scab, Karathane damage to mildewed pears. *Raspberry:* control of *Thomasiniana theobaldi* by the removal of new shoots until after the first flight. *Cucumbers:* Karathane for controlling powdery mildew, and maneb sprays for controlling anthracnose. *Chicory:* control of *Sclerotinia sclerotiorum. Tagetes:* control of *Pseudomonas* sp. by seed treatment or plant sprays. *Onion:* calomel seed treatment against *Sclerotium cepivorum. Virology.* Meristem culture of strawberry, carnation and delphinium. Virus diseases of strawberry, cherry, cucumber, tobacco, pea and raspberry. *Nematology.* Soil fumigation with DD has kept populations of *Pratylenchus penetrans* low for 3 years. *Disease resistance.* Studies on asparagus (*Fusarium* wilt), beans (virus and anthracnose), cabbages and turnips (club root) and tomatoes (leaf mould). *Economic use of pest control materials.* Application of zineb and heptachlor to brussels sprouts, and of parathion plus manganese sulphate to peas. *Air pollution.* Sensitivity of tulips to hydrogen fluoride and sulphur dioxide.

2006. Iowa.
Your division of agriculture reports, being *Annual Report of the Division of Agriculture of Iowa State College for 1957-1958,* pp. 74, illus.

Included in this non-technical report are short items describing work on lawn grass culture, variety trials with vegetables, flowers and fruit, pest control in vegetables and fruit, and weed control in vines, small fruit and lawns.

2007. Lausanne (Gallay, R.).
Stations fédérales d'essais agricoles, Lausanne. Sous-stations en Valais et au Tessin. Domaines à Caudoz (Pully), Changins (Nyon), La Frêtaz (Bullet). Rapport d'activité 1957. (**Annual Report for 1957 of the Swiss Agricultural Research Stations at Lausanne, with sub-stations in Valais and Tessin, and at Pully, Nyon and Bullet.**)
Landw. Jb. Schweiz., 1958, **7**: 255-574, bibls, illus.

Current work on horticultural crops is discussed in Part I under the following headings: *Plant improvement:* Vine varieties, cultural methods and quality of the crop; top fruit varieties, rootstocks and cultural techniques; detailed tomato variety trials with particular reference to earliness; variety and cultural trials with onions; and the chilling of tomato plants to enhance earliness. *Technology of agricultural produce:* Wine quality of new grape varieties. *The control of diseases and pests:* Various diseases of vines, scab control on apples, *Clasterosporium carpophilum* on cherries and *Didymella lycopersici* on tomatoes; cockchafer and San José scale control; peach, tobacco and apple virus diseases; weed control in strawberries, the control of grasses by dalapon, and spray injury to vines. [See also separate abstracts.]

2008. Madras.
Administration Report of the Agricultural Department for the Fasli 1366 (1st. July 1956 to 30th June 1957), Parts I and II, 1958, pp. 555, illus.

Progress reports include work on the following: *Entomology:* Control of plum fruit fly (*Chaetodacus* sp.), pests of coconuts and oil seeds. *Mycology:* Fusarium wilt of Solanaceae; legume anthracnose; banana wilt (*Fusarium oxysporum* var. *cubense*) and anthracnose (*Gloeosporium musarum*) control. *Oilseeds:* Selection and breeding, cultural and fertilizer trials with coconuts, castor and sesame. *Sugar cane:* Selection and breeding, manurial and cultural experiments, pest and disease control. *Horticultural crops:* Studies of apple rootstocks; mango propagation; citrus rootstocks; banana selection and breeding, and cultural trials; pineapple breeding; durian propagation; granadilla hand pollination; plum spraying to increase fruit set; jackfruit propagation and selection; papaw selection and breeding; sapodilla breeding and rootstock studies; clove and cacao propagation; cashew pest and disease survey and propagation studies; vegetables, including tomato and eggplant, varietal selection and disease control; ginger manurial and cultural trials, and disease control.

2009. Norman, A. G. (Editor).
Advances in agronomy, Volume X.
Academic Press, New York, 1958, 9×6 in., pp. 547, bibls, illus.

Articles of direct interest to producers of oil-seed crops in this year's volume are: Castorbeans: a new oil crop for mechanized production, by L. H. Zimmerman; and Safflower, by P. F. Knowles. Articles of indirect horticultural interest are: Changing concepts of plant nutrient behaviour and fertilizer use, by W. L. Nelson and G. Stanford; Reactions of ammonia in soils, by M. M. Mortland; The role of sulfur in soil fertility, by H. V. Jordan and L. E. Ensminger; and Liming, by N. T. Coleman, E. J. Kamprath and S. B. Weed.

2010. Royal Tropical Institute, Amsterdam.
Inlichtingen en Onderzoekingen van de Afdeling Tropische Producten in 1957. (**Information and Research in 1957 of the Tropical Products' Department.**) [English summary 12 pp.], 1958, pp. 68, bibls, illus., fl. 3.50.

Among the studies reported are: *Essential oils:* oil from patchouli twigs; shaddock peel oil. *Soil problems:* physiological diagnosis in relation to coconut cultivation. *Oils and fats:* a leaf abnormality of oil palms; avocado oil characters. *Tea:* samples from Argentina, Colombia and Brazil; Cu content of black teas. *Fibres:* Surinam leaf fibres. *Fruits:* analysis of Japanese canning oranges and of banana flakes.

2011. Smith, K. M., and Lauffer, M. A. (Editors).
Advances in virus research, Vol. VI.
Academic Press, New York, 1959, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 382, bibls, illus., 80s.

Among review articles included in this volume are: The purification of plant viruses, by R. L. Steere; Biochemistry of plant virus infection, by C. A. Porter; and The spread of plant viruses, by L. Broadbent and C. Martini.

2012. SOCIETY OF CHEMICAL INDUSTRY.
Reports on the progress of applied chemistry, 1957, Vol. 42, 8½×5½ in., pp. 910, Soc. Chem. Ind., 14 Belgrave Square, London, S.W.1.

Sections of special horticultural interest are as follows: *Crops*, by G. E. G. Mattingly, of Rothamsted, pp. 566-72, bibl. 44, including nutrition of oil palms and other tropical plantation crops. *Horticulture*, by C. Bould, of Long Ashton, pp. 572-80, bibl. 38, dealing with nutrition and metal chelates. *Organophosphorus insecticides*, by A. H. M. Kirby, of East Malling, pp. 596-605, bibl. 44. *Control of plant nematodes*, by F. Call and N. G. Hague of Imperial College, pp. 605-12, bibl. 78. *Herbicides*, by R. G. Powell, of Oxford University, pp. 612-15, bibl. 28. *Application of concentrated sprays*, by J. B. Byass, of the N.I.A.E., Silsoe, pp. 618-23, bibl. 18.

2013. STEINHAUS, E. A., AND SMITH, R. F. (Editors).
Annual review of entomology, Vol. 4.
Annual Reviews Inc., Palo Alto, Calif., 1959, pp. 467, bibls, illus., $7.00 (U.S.A.) or $7.50 (elsewhere).

Of direct or indirect horticultural interest among the 19 reviews are: Biological control of weeds with insects, by C. B. Huffaker (pp. 251-76, bibl. 124); Microbial control of insect pests, by Y. Tanada (pp. 277-302, bibl. 225); Deciduous fruit insects and their control, by M. M. Barnes (pp. 343-62, bibl. 188); and Seed treatment as a method of insect control, by W. H. Lange, Jr. (pp. 363-88, bibl. 195).

2014. TYSSER, H. F. (Editor).
The Fruit Annual, 1959.
British-Continental Trade Press Ltd., Strand, London, pp. 637, 20s.

This remarkable encyclopaedia of practical information on the fruit trade must be about the best value for money that any commercial firm concerned with the import or export of fruit in Great Britain or overseas can wish for. It would be tedious to list the many sections, which, generally speaking, occur here each year and apparently nowhere else, at least in such compact form. While Mr. Tysser compiles chiefly for the importer and exporter, he does not neglect the grower and this time provides an extremely interesting section (pp. 115-32) on mechanization in harvesting and prepackaging of orchard fruit. A further 2-page article concerns the air transport of fruit and vegetables.

2015. ZANZIBAR.
Annual Report of the Zanzibar Department of Agriculture, 1957, 1958, pp. 37, 2s.

Work mentioned includes: *Cloves:* disease control experiments. *Coconuts:* control of *Pseudotheraptus wayi*. *Derris:* rotenone content was highest, 8·9%, in plants harvested at 12 months. *Tobacco:* variety trials. [See also next abstract.]

2016. ZANZIBAR.
Supplement to the Annual Report of the Department of Agriculture, Zanzibar, 1957. Results of Field Experiments, Crops and Stock Records and other Statistics, 1958, pp. 21, 1s. 6d.

Cloves: Gliricidia maculata and *Peltophorum ferrugineum* were the best shade trees tried, but neither was superior to bananas for establishing young cloves. *Coffee:* Mulching, in the 3rd bearing year, continued to cause significant yield increases with liberica. *Derris:* K caused reduced yields in a fertilizer trial. Harvesting after 18 or 24 months' growth was better than at 12 months; 2-ft spacing was better than 3 or 4 ft. *Limes:* Budded trees outyielded seedlings, but fertilizer treatment caused no significant yield increases. *Pineapples:* Mulching with coir dust produced a greater yield and heavier and later fruit.

New periodical.

2017. SOCIEDAD ENTOMOLÓGIA AGRÍCOLA DEL PERU.
Revista Peruana de Entomológia Agrícola [*Rev. peru. Ent. agríc.*], 1958, Vol. 1, No. 1, 10½×8 in., pp. 74, bibls, illus., price overseas $1.50, from Sociedad Entomológia Agrícola del Perú, Comisión de Publicaciones, Apartado 4796, Lima, Perú.

This journal, which is to appear annually, presents papers on Peruvian insects of agricultural importance. This first issue consists of 24 papers in Spanish, mainly on pests of cotton. A paper on sugarcane borers and 2 papers on fruit flies are abstracted separately. The journal, in spite of its rather small type, is well printed and presented.

Noted

2018.

a ALBERTA.
Annual Report of the Department of Agriculture of the Province of Alberta for the year 1957, 1958, pp. 195, illus.
Including work at the Horticultural Station, Brooks (pp. 37-43).

b ***Amateur Gardening Handbooks,*** issued by Collingridge, London, No. 22, 1957, and No. 30, 1958, pp. 92 each, illus., 4s. each.
Tuffin, H. R., Grapes, peaches and nectarines [including chapter on outdoor grapes].
Vautier, J. G., Hardy plants [ornamentals].

c AUSTRALIA.
Thirtieth Annual Report of the Australian Wine Board for year 1957-1958, Adelaide, 1958, pp. 16.
Production and exports.

d CALIFORNIA.
Thirty-eighth Annual Report of the State of California Department of Agriculture, period ending December 31, 1957.
Bull. Calif. Dep. Agric., 1958, **47**: 38-214, illus.

e CANTERBURY AGRICULTURAL COLLEGE, N.Z.
Annual Review for year ending 30th June, 1958, 1958, pp. 108, illus.

f COMMERCIAL GROWER.
The Commercial Grower Handbook and Diary, 1959.
Benn Bros., Fleet Street, London, 1958, 9×6 in., pp. 322, 15s.
Packed with useful information for the grower on the lines indicated in *H.A.*, 25: 3387.

g DEUTSCHER PFLANZENSCHUTZDIENST.
Jahresberichte der Pflanzenschutzämter 1957. **(Annual Reports of the West German Plant Protection Service for 1957.)**
Biologische Bundesanstalt für Land- und Forstwirtschaft, 1958, pp. 264.
Activities of 18 stations on pest and disease control, with a subject index.

h GRAINGER, T. H., Jr.
A guide to the history of bacteriology.
Ronald Press, New York, 1958, 8½×5½ in., pp. 210, bibl. 2,802.
Interesting as a work of reference, but a very, very long way from the normal literary fodder browsed on by horticulturists.

i INSTITUUT VOOR TOEGEPAST BIOLOGISCH ONDERZOEK IN DE NATUUR.
Werkzaamheden in 1957. **(Annual Report of the Institute for Biological Field Research, Arnhem, for 1957.)** [English summary 1½ pp.]
Meded. Inst. Toegep. biol. Onderz. Nat. **38**, 1958, pp. 34.
Including windbreak studies.

j MINISTRY OF AGRICULTURE, LONDON.
Agricultural Statistics 1956-57, England and Wales.
H.M.S.O., London, 1958, pp. 170, 10s.

k ROBYNS, W.
Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. Tableau analytique des Familles. **(Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes. Analytical table of families.)**
Institut national pour l'Étude agronomique du Congo belge, Brussels, 1958, 10×6½ in., pp. 67.
Key to 189 families in dichotomous form and based on visible characters [see also *H.A.*, 28: 4200u].

l ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Zeven en Veertigste Jaarverslag Koninklijk Instituut voor de Tropen, Amsterdam, 1957. **(47th Annual Report of the Royal Institute for the Tropics, Amsterdam, 1957)**, pp. 78, illus.

m ST. VINCENT.
Annual Report on the Agricultural Department, St. Vincent, for 1954, 1958, pp. 44.

n ZÜRICH-OERLIKON.
Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1957. **(Annual Report of the Zürich-Oerlikon Agricultural Research Station for 1957.)**
Landw. Jb. Schweiz, 1958, **7**: 575-651.